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Skeptical Inquirer

THE MAGAZINE FOR SCIENCE AND REASON

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"… promotes scientific inquiry, critical investigation, and the use of reason in examining controversial and extraordinary claims."

[FROM THE EDITOR

Myths Driving Wildlife Extinction

We were on a walking trek in wilderness Tanzania. Our guide, Thad, had obtained a special license for us to trek and camp in a part of the eastern Serengeti miles from any road, far from the areas most visitors see. Suddenly our tiny group came across a freshly abandoned poachers camp. Thad, an American born in Tanzania and who has lived all his life there, was furious. So was his assistant, a member of one of the local tribes. They set about destroying the camp. They angrily tore it apart, while the rest of us nervously looked over our shoulders wondering if the poachers were watching from the hills above. That was in 2009. Since then, as Bob Ladendorf and Brett Ladendorf report in this issue's cover article "Wildlife Apocalypse," poaching of big game in Africa has vastly accelerated. In 2005 sixty rhinos in Africa were killed for their horns or as trophies. Since then 7,000 more have been killed. The situation for elephants is even worse. Some 30,000 elephants are poached every year for their ivory. As one observer says, "Traders in ivory actually want the extinction of elephants." It pushes prices ever higher.

It's a sad and maddening tragedy happening right in front of us, and it is driven largely by myth and superstition—the bogus idea prevalent in certain Asian countries that rhino horns and elephant tusks have medicinal value as tonics, blood-purifiers, or aphrodisiacs. If you ever get asked, regarding superstitions and myths, "What is the harm?" you need only point to this extinction event driven by mythology occurring right now. It is tragic. And heart-breaking.

We scientific skeptics continually debate issues of skepticism among ourselves. A lot of that self-scrutiny is going on right now, and it's generally healthy. In this issue's "Skepticism Reloaded," a longtime member of our editorial board and a leading figure in skepticism in Europe, Amardeo Sarma, asks (and suggests some succinct answers to) the relevant questions: Why do we do what we do? ("to seek a world where pseudoscientific claims do not deceive or harm anyone"). What makes us different? (We take on issues others are silent about; we focus on delusions, self-delusion, and wishful thinking that can lead us astray; and we are truly nonpartisan and independent.) He argues that scientific skepticism is central to everyone's well being, whether they know it or not. He emphasizes skepticism's global nature. In a section titled "Skeptics Are Human" he calls for greater diversity and candidly discusses problems caused by improper behaviors. He talks about the need for more professionalism and better branding. He suggests future priorities. "We have a cause of utmost significance," he writes. We must do as good as we possibly can.

Claims about cell phones and cancer have emerged again with a report this year from the National Toxicology Program that seems to show a few troubling associations. In a Research Review in this issue, Christopher Labos, a cardiologist and epidemiologist, and Kenneth R. Foster, a scientist who has extensively studied the interaction of nonionizing radiation and biological systems, provide a calm and scientifically reasoned assessment of those results. They find the varied results so inconsistent that random chance may be the most operative cause.

—Kendrick Frazier

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CBS Drops Skepticism in *Sunday Morning* Paranormal Segment; CSI Issues Critical Statement

Kendrick Frazier

CBS is one of America's premier television networks. It practically invented television news. It was the home of Edward R. Murrow and Walter Cronkite. And its ninety-minute Sunday morning news and feature program, appropriately titled *Sunday Morning*, is likewise well regarded. It tends to emphasize cultural fare such as music, art, film, dance, and lifestyle trends, but whatever it takes on, you can expect it to do a fine job.

That is until its program on March 18, 2018. Oh, it started out promising enough. That particular Sunday's overall theme was "Genius," and there was Walter Isaacson talking about Leonardo da Vinci, Steve Jobs, Einstein, and other brilliant people he has chronicled in best-selling biographies. All good.

The most skeptical they got on Geller was that he proved to be "unreliable."

Then came segment four. Its topic—"ESP: Inside the Government's Secret Program on Psychic Spies." *What?* That subject might fit into a program on popular delusions. But in a program on the subject of genius? Are they implying that some people have extraordinary powers and that psychic claims are legitimate? I hoped not, but, sadly, I was wrong.

They set the tone at the very beginning. There was Uri Geller before the camera, doing his "psychic" stuff. James Randi and countless others long ago exposed Geller as a clever but mediocre magician doing the kinds of things magicians (or conjurors) have done for eons. But Geller of course claimed his feats were real, and he initially fooled a lot of people, including some scientists. But that was back in the 1970s and early '80s, and all that changed once his trickery was exposed and explained countless times.

They showed him bending spoons and divining the contents of sealed envelopes. It implied his abilities were genuine. I kept waiting for some video clip of Randi debunking him. No. The most skeptical they got on Geller was that he proved to be "unreliable" and that on *The Tonight Show Starring Johnny Carson* he failed (but the video clip they showed was very short and unclear).

"Geller had caught the eye of the intelligence community," intoned the narrator with great seriousness. And

Statement by Committee for Skeptical Inquiry on the CBS Segment

The segment on ESP and the paranormal on this week's CBS *Sunday Morning* nationally aired television show (March 18) was a regrettable lapse in the CBS network's usually objective and reliable coverage. We call on CBS and the *Sunday Morning* show to take steps to correct the record and provide a more truthful and scientifically accurate view of the topic.

The segment provided a scientifically inaccurate and journalistically irresponsible treatment of the subject of alleged psychic powers. With only one too-brief exception, the people who appeared on camera are strong proponents of the paranormal. The segment's few moments of skepticism were overwhelmed by anecdotes, claims, and assertions that portrayed psychics as genuine and paranormal powers as a likely reality, in contrast to the scientific evidence. In the context of the overall theme of this particular *Sunday Morning* show, "Genius," the clear impression given was that some unusual people possess paranormal powers, a conclusion contrary to all reliable scientific evidence.

This segment was remarkably uninformed by journalistic skepticism or by the decades of reliable scientific studies that have failed to find evidence of paranormal powers. It seemed almost a throwback to an earlier time before most responsible TV networks and news organizations learned to treat such topics with great caution and to obtain and heed reliable scientific advice before airing such dubious claims. This is very troubling in such a controversial area. We hope it is an anomaly.

The Committee for Skeptical Inquiry, a group made up of distinguished scientists (including three Nobel laureates), scholars, investigators, and science communicators that publishes the magazine Skeptical Inquirer and is part of the nonprofit Center for Inquiry, calls on CBS to take steps to correct the record.

We ask the network and *Sunday Morning* to provide a more truthful and scientifically rigorous view of this topic. Producers and reporters should become familiar with the real scientific evidence and not allow paranormal proponents to use CBS's great and well-deserved journalistic reputation to advance their agendas.

—Issued by Committee for Skeptical Inquiry, March 19, 2018

(The statement is online at https://www.csicop.org/news/press_releases/show/cbs_esp_paranormal.)

from then on we were in fantasy world. This took them into remote viewing and Project Stargate and the secret government-sponsored experiments in the 1980s that University of Oregon psychologist Ray Hyman (a founding member of our Executive Council) has thoroughly examined and critiqued.

Here pro-paranormal journalist Annie Jacobsen was their guide, plus

Author Annie Jacobsen on *CBS Sunday Morning*.

Subjects such as these are notoriously difficult for most reporters and news organizations to handle correctly. They are filled with pitfalls.

Dean Radin, identified not as a parapsychologist but as a "scientist." Radin was on camera a lot. Jacobsen touted the experiments in remote viewing of Soviet military activities as a big success. Of the secret research program, Radin claimed bluntly: "It *did* work." He offered not a scintilla of scientific skepticism toward it.

Then they brought on a psychic, Angela Ford, promoting her claims of helping authorities find a fugitive. She had said he was in a particular town in Wyoming. When he was found a hundred miles from that town, it was touted as a great success. (See Joe Nickell's critique of that specific claim elsewhere in this issue.)

Then Radin, of the pro-paranormal Institute of Noetic Sciences, put CBS *Sunday Morning* correspondent Erin Moriarty herself through an ESP test. "This experiment is going to see if your body responds before you see an emotional picture as compared to before a calm picture." Hmmmm. That's a legitimate test for ESP? Radin seemed to think so. They proceeded. Moriarty's eyes supposedly reacted five seconds before seeing the emotional picture. Radin said with a straight face that she demonstrated precognition.

"Whoa, I sure didn't see that coming!" Moriarty exclaimed. "Which is why I have my doubts." But she was clearly impressed.

There were only a few other minor moments of skepticism. Midway through the segment, noted Caltech physicist Sean Carroll was brought on. Asked if such a thing as ESP exists, he was allowed to say on camera, "No, I think we know enough about the brain to say, no, it really doesn't work that way. We'd be able to test it, be able to put a little receiver next to your head and pick up those signals if they were actually coming."

But those few seconds of skepticism were far outweighed by all the statements and imagery promoting paranormal powers. For instance, Angela Ford was asked if ESP exists: "Yes, it does. Yeah, of course." Radin (essentially showing us why CBS included this segment in an overall program on "Genius"): "What we're talking about is something like a talent, similar to musical talent or sports talent. So, there will be some people who are the Olympic levels; most of us aren't there."

The segment ended, contrarily but honestly, with Jacobsen saying, "There is no proof. It does not pass scientific muster." Yet the whole thrust of the segment, the whole idea of its being part of an overall theme on "Genius," was that such paranormal powers probably indeed *do* exist.

The segment prompted the Committee for Skeptical Inquiry (CSI), copublisher of the Skeptical Inquirer with the Center for Inquiry, to issue a statement the next day strongly criticizing that segment's lack of journalistic and scientific care. See the text of the statement on page 5.

Subjects such as these are notoriously difficult for most reporters and news organizations to handle correctly. They are filled with pitfalls. Producers and reporters, even good ones, who do not make themselves fully aware of the long history of deceptions and delusions by many paranormal claimants and of the gullibility and desire to believe of other well-meaning proponents, even some researchers with credentials, can fall into those pits of misinformation. Such stories require rigorous scientific thinking and lots of expert advice by scientifically trained and skeptically inclined experts.

When the next day the Richard Dawkins Foundation for Reason & Science tweeted criticisms of the program, stimulated by CSI's statement, reporter Moriarty did offer one tweet reply in her defense, but it was a weak one: "We reported on government experiments with the paranormal—supported by declassified Govt documents. We gave time to both those involved and scientists."

And that leads us to emphasize again that just because some part of the government initiated a bizarre little research program at some point in the past, that is not itself a validation of the claims it was studying. The whole point of research is to find out what is true. And the Star-

gate program, in contrast to Radin's claim, had at best mixed results. It was shut down in 1995. Another point: all such efforts tend to have a few strong proponents, often believers, within the agency pushing them strongly, and unless those people are counterbalanced by good outside scientists and skeptics, the outcome can be misleading. Also, just because a program is, or was, labeled "secret" doesn't necessarily make it any more valid. Reporting on "secret" programs appeals to the news media, but the Skeptical Inquirer had been writing about and publishing critiques of Stargate since at least the early 1990s. It isn't exactly news in 2018.

As for Moriarty's assertion that the segment was balanced, the Center for Inquiry's Stephanie Guttormson timed a videotape of the segment and found it more than 97 percent pro-paranormal and only 3 percent skeptical.

As skeptic Jay Diamond sarcastically put it in response to my Facebook post about it the evening it aired:

> Seems quite balanced ... I mean they had Sean Carroll on for 5 seconds saying it was nonsense, then 6 minutes of [others] making extraordinary, unsubstantiated but science-sounding claims. Now THAT'S good journalism!
>
> PLUS - we discovered that reporter Erin Moriarty has psychic abilities! Wow - no psychics saw THAT coming!

Two other posts said simply, "It was infuriating" and "I was mortified."

Skeptic Steven Novella blogged the next day about the segment, and the text of that appears on page 15.

Further Background on These Psychic Claims

Ray Hyman, "The Evidence for Psychic Functioning: Claims vs. Reality." Skeptical Inquirer, March/April 1996. It's available on our website at https://www.csicop.org/si/show/evidence_for_psychic_functioning_claims_vs._reality.

Hyman's opening:

> The recent media frenzy over the Stargate report violated the truth. Sober scientific assessment has little hope of winning in the public forum when pitted against unsubstantiated and unchallenged claims of "psychics" and psychic researchers—especially when the claimants shamelessly indulge in hyperbole. While this situation may be depressing, it is not unexpected. The proponents of the paranormal have seized an opportunity to achieve by propaganda what they have failed to achieve through science.

CSI Senior Research Fellow Joe Nickell, in "Mind Over Metal" (Skeptical Inquirer, July/August 2013), offered a good summary about metal-bending claims, starting with Uri Geller and how they've been shown to be simple tricks. It is online at https://www.csicop.org/si/show/mind_over_metal.

In "Remotely Viewed? The Charlie Jordan Case," in *Skeptical Briefs* back in 2001, Joe Nickell provided his review and evaluation of the Stargate program and his critique of the claims that a psychic found a fugitive in Lovell, Wyoming. It's online on our website at https://www.csicop.org/sb/show/remotely_viewed_the_charlie_jordan_case.

Nickell's conclusion:

> In summary, the Charlie Jordan case, touted as one of the most successful examples of remote viewing in the U.S. government's psychic-spying project, is not convincing evidence of anything—save perhaps folly. Not only was the case actually an example of alleged spirit contact rather than extrasensory perception but it also illustrates the limitations of anecdotal evidence: conflicting versions, selective reporting, and lack of documentation, together with additional manifestations of faulty memory, bias, and other human foibles.

A critique of Dean Radin's book *Supernormal* appeared in the January/February 2014 Skeptical Inquirer, "When Big Evidence Isn't: The Statistical Pitfalls of Dean Radin's *Supernormal*." It is online at https://www.csicop.org/si/show/when_big_evidence_isnt_the_statistical_pitfalls_of_dean_radins_supernormal.

Ray Hyman's article "Anomalous Cognition? A Second Perspective" appeared in the July/August 2008 Skeptical Inquirer and is online at https://www.csicop.org/si/show/anomalous_cognition_a_second_perspective.

James Alcock's critique of the book *Extrasensory Perception* appeared in the Skeptical Inquirer, July/August 2016. It's online at https://www.csicop.org/si/show/heavy_with_praise_light_with_skepticism.

Also relevant: *Psi Wars: Getting to Grips with the Paranormal,* edited by James Alcock, Jean Burns, and Anthony Freeman, Imprint Academic, Exeter, UK, 2003, and Alcock's brand new book *Belief,* Prometheus Books, 2018.

FDA Has Duty to Crack Down on Homeopathic Fake Medicine, Says Center for Inquiry

The Food and Drug Administration (FDA) must take a much firmer stance on the manufacturing and marketing of homeopathic health products, said the Center for Inquiry (CFI) in comments submitted to the FDA March 26, urging the agency to take seriously its duty to inform and protect American consumers from wasteful and dangerous fake medicine. CFI called for the agency to expand the scope of its Draft Guidance for Drug Products Labeled as Homeopathic[1] to fulfill its responsibility to the American people and ensure that these pseudoscientific products are properly tested and labeled.

"Homeopathy is a sham. About this, there is no doubt whatsoever. Every piece of credible scientific research has demonstrated that it has no effect of any kind other than as a placebo," said Nick Little, CFI's vice president and general counsel. "Nonetheless, this modern-day snake oil exists in a shadow legal status, where it can be sold without being subject to the same testing and labeling requirements that real, science-based medicine must follow. It is a recipe for waste, fraud, and tragedy."

The FDA's draft guidelines suggested a risk-based approach, focusing on the regulation of homeopathic products when the ingredients or method of administration pose particular dangers, the condition it claims to treat is particularly serious, the target population is particularly vulnerable (such as children or the elderly), or when the product is revealed to be tainted. However, the draft also recommended the withdrawal of the existing Compliance Policy Guide regarding homeopathy.

In its comments, CFI drew the FDA's attention to the absence of evidence for the efficacy of homeopathic products and the absurdity of the claims made as to the nature of homeopathy. For example, homeopaths maintain their products become stronger the more diluted they are. The homeopathic product Oscillococcinum, marketed to reduce the dura-

tion and severity of flu symptoms, contains the heart and liver of the Muscovy duck, diluted to a level of 200C, leaving one part of alleged active ingredient to every 10^{400} parts of water. For reference, current estimates suggest that the known universe contains up to 10^{82} atoms.

"We enthusiastically support the FDA coming down hard on homeopathy where the products are tainted or sold as miracle cures for fatal diseases," said Little. "But that's not nearly enough. Americans waste billions of dollars every year on homeopathic sugar pills. The FDA has a duty not just to those poisoned by homeopathy, but also to those fleeced of their hard earned dollars."

In its comments, CFI drew the FDA's attention to the absence of evidence for the efficacy of homeopathic products.

CFI requested that the FDA use its existing power to ensure homeopathic products are required to pass the same safety and efficacy tests applied to non-homeopathic drugs. Alternatively, CFI asked that at the very least the FDA mandate that homeopathic products carry labels indicating they have not been evaluated for safety or effectiveness by the FDA and list in plain English the claimed active ingredient in the product and its quantity.

"Consumers have a right to the truth about the medical products they purchase," said Little. "Homeopathic manufacturers should not be allowed to hide behind archaic ingredient names and mystifying measurement systems on their labeling. That's why CFI has already filed a complaint with the District of Columbia Attorney General's office regarding the marketing of homeopathic products."

Note

1. https://www.fda.gov/downloads/Drugs/GuidanceComplianceRegulatoryInformation/Guidances/UCM589373.pdf.

UFO over Arizona Likely an IFO

Joe Nickell

In March 2018, a month after the fact, the FAA released a radio broadcast of what CBS News called an "out-of-this-world incident." Actually, the UFO, seen by two separate civil aviation pilots flying over Arizona, has a very, very likely real-world explanation.

The object was first reported by the pilot of a Learjet operated by Phoenix Air, who contacted air traffic control to ask, "Was anybody, uh, above us that passed us like thirty seconds ago?" The object was verified by a second pilot, from American Airlines Flight 1095, after being queried by the controller: "Yeah, something just passed us. I don't know what it was, but it was at least two, three thousand feet above us." The controller could not verify that any other aircraft was present at that location. He joked to the Learjet pilot, "Maybe a UFO," provoking a laugh. The American Airlines pilot said he could not identify the object but that it was traveling in the opposite direction and was extremely bright. He was asked if it might have been "a Google balloon" (one of a network of balloons about eleven miles above Earth intended to provide internet access to rural areas). He replied, "Doubtful." Not long after the incident, Bob Tracey of Phoenix Air Group spoke with the Learjet captain who told him he had been flying at approximately 37,000 feet and that the unidentified object was several thousand feet above. "The glare was so intense," said Tracey, "they couldn't make it out." The American Airlines 1095 pilot confirmed the effect, stating, "Couldn't make it out whether it was a balloon or whatnot. But it was just beaming light, or could have had a big reflection."

I contacted my friend and colleague Major James McGaha, USAF retired, a Committee for Skeptical Inquiry scientific and technical consultant. A former Special Operations pilot, as well as an astronomer (he is director of Arizona's Grasslands Observatory), he has a unique knowledge of the sky. Using several online sources, I researched the case, anticipating some of the information he would want.

The sightings occurred near the Davis-Monthan Air Force Base (Tucson) at about 3:30 PM local time on February 24. The object was reported flying in the opposite direction to the planes, but that would also *appear* to be the case if the object was relatively stationary. In fact, neither pilot could be sure of the object's actual motion or lack thereof. The Learjet pilot did insist, "It wasn't an airplane."

McGaha pointed out that whenever a very bright light source is seen during the daytime, it is most likely a reflection of sunlight off an object.

McGaha pointed out that whenever a very bright light source is seen during the daytime, it is most likely a reflection of sunlight off an object. Given the time and place of the sighting, and therefore the angle and azimuth of the sun, he says, the Arizona UFO is fully consistent with this scenario: a reflective, slowly drifting object at high altitude, very brightly lit by the sun.

Given these findings, McGaha says, together with the corroborative evidence provided by the two pilots, the mystery object can be identified as very likely some type of balloon—such as a high-altitude research balloon—inadvertently, in this instance, doubling as a UFO.

For references, please see http://www.centerforinquiry.net/blogs/entry/ufo_over_arizona_likely_ifo/.

Woomonger Radio Host Art Bell Dies at Seventy-Two

BENJAMIN RADFORD

Longtime radio talk show host and paranormal promoter Art Bell died on April 13, 2018, at the age of seventy-two at his home in Pahrump, Nevada. Bell achieved national prominence for *Coast to Coast*, a five-hour overnight show devoted to conspiracy theories, UFOs, and all manner of the paranormal. Much of the show was devoted to unscreened (and often unhinged) listeners calling in with their personal stories of seemingly unexplainable and sinister phenomena. *Coast to Coast* was broadcast from 1989 to 2003; at its peak in the 1990s, the show reached as many as 10 million listeners a week.

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In (dis)honor of Bell's position as a perennial promoter of paranormal pabulum, he received CSICOP (now the Committee for Skeptical Inquiry)'s Snuffed Candle Award in 1998 for his track record of "encouraging credulity, presenting pseudoscience as genuine, and contributing to the public's lack of understanding of the methods of scientific inquiry." (Bell accepted the award in good humor, mindful that any attention is good attention.)

Bell may be most notorious among skeptics for his role in the death of thirty-nine members of the Heaven's Gate UFO cult in 1997. As Tom Genoni wrote in his article "Art Bell, Heaven's Gate, and Journalistic Integrity" (SI, July/August 1997):

> Following the Heaven's Gate suicides, the public learned that news of a "companion UFO" trailing Comet Hale-Bopp—a rumor spread predominately by late-night talk radio host Art Bell—may well have contributed to cult members taking their lives in an attempt to "graduate," as their Web site described it, to a "higher level" and leave Earth in a spacecraft. ...
>
> Theories about a strange object near Hale-Bopp were first made public in November of 1996 when Chuck Shramek, an amateur astronomer from Houston, called Art Bell's program to report that a photograph of his appeared to show a large object behind the comet, an object he speculated to be up to four times the size of Earth. The following night, Courtney Brown, a tenured professor of political science at Emory University and director of the Farsight Institute in Atlanta, was a guest on Bell's show and claimed that three "remote viewers" associated with his institute had confirmed Shramek's findings and, incredibly, had determined it to be a metallic object full of aliens ... .
>
> The cult's Internet link to the Art Bell homepage indicates it's likely they first heard about an approaching spaceship during Bell's two-month-long UFO escapade.
>
> But whatever the Heaven's Gate cult members or anyone else may have done with the information presented on his radio show, Bell feels that is not his responsibility. "I'm not going to stop presenting my material because there are unstable people," he insists. "That's what the First Amendment is all about."

Whether Bell believed the stories he helped popularize is unclear, but his influence on American popular culture is undeniable, and his legacy of broadcasting anecdotes and evidence-free conspiracy theories lives on in media personalities such as Alex Jones.

Lies and False News Spread Faster, Farther Online Than Truth, Study Shows

KENDRICK FRAZIER

"A lie can travel half way around the world while the truth is putting on its shoes."
—Charles Spurgeon

Those may be the words of a nineteenth-century English Baptist preacher, but scientific skeptics also know that no debunking of a bizarre claim can ever catch up with the original story. And that's now especially so in our age of social media.

Scientists from MIT's Media Lab have documented and quantified this sad truth about the truth in an intriguing new study of the spread of true and false news online. The researchers, Soroush Vosoughi, Deb Roy, and Sinan Aral, investigated the differential diffusion of all the verified true and false news stories distributed on Twitter from 2006 to 2017. Altogether they analyzed the dissemination of 126,000 stories tweeted by around 3 million people more than 4.5 million times. Their study is published in the March 9 *Science*.

MIT's institutional review board approved the research, and Twitter funded it and provided access to the data.

The researchers classified the news as either true or false using information from six independent fact-gathering organizations that exhibited 95 to 98 percent agreement on the classifications. They used a broad definition of *news*. Instead of a more source-based description, they refer to any asserted claim made on Twitter as news.

The result? Falsehood won. Overwhelmingly so. Totally. Without question. "Falsehood diffused significantly farther, faster, deeper, and more broadly than the truth in all categories of information," they report.

They found that a significantly greater fraction of false cascades of tweets than true cases exceeded a depth of ten—meaning there were ten retweet hops by new unique users from the original tweet over time. Also, "The top 0.01 percent of false cascades diffused eight hops deeper into the Twittersphere than the truth."

Falsehoods also reached far more people than the truth. The truth rarely diffused to more than 1,000 people, but the top 1 percent of false-news cascades

routinely diffused to between 1,000 and 100,000 people. At every depth of a cascade of tweets, falsehood reached more people. This means, say the authors, "that many more people retweeted falsehood than they did the truth."

Truth took six times as long as falsehood to reach 1,500 people and twenty times as long as falsehood to reach a cascade depth of ten.

The worst type of offender? Political news. "False political news spread faster and farther than false news about terrorism, natural disasters, science, or urban legends," they report. The total number of false political rumors peaked at the end of both 2013 and 2015 and again at the end of 2016, corresponding to the last U.S. presidential election. There were also peaks during the Russian annexation of Crimea in 2014. Politics became the largest rumor category in their data, with about 45,000 cascades, followed by urban legends, business, terrorism, science, entertainment, and natural disasters.

Why all this? What gives false news so much power? They point to its novel character. "We found that false news was more novel than true news, which suggests that people were more likely to share novel information." True stories may have inspired anticipation, sadness, joy, and trust, but the false news inspired "fear, disgust, and surprise in their replies." Those reactions apparently prompt more sharing.

The authors carried out a number of tests of novelty that support their conclusion. "Although we cannot claim that novelty causes retweets or that novelty is the only reason why false news is retweeted more often, we do find that false news is more novel and that novel information is more likely to be retweeted" (p. 1149).

What about automated bots? "We conclude that human behavior contributes more to the differential spread of falsity and truth than automated robots do," say the authors.

Understanding how false news spreads is the first step toward containing it, they note. "We hope our work inspires more large-scale research into the causes and consequences of the spread of false news as well as its potential cures."

Further Reading

See also the Policy Forum "The Science of Fake News," by David Lazer and fifteen other researchers in the same issue of *Science*.

'Alien' Mummy Identified By DNA

Benjamin Radford

The mystery of Ata the mini-mummy began when seemingly humanoid remains were found in 2003. The figure, a mere six inches tall with an oddly conical skull and enlarged eye sockets, was found in the small town of La Noria, 450 miles north of Chile's Atacama Desert. Like many such artifacts, it was sold—its provenance and therefore legality is murky—eventually coming to the attention of UFO enthusiast Steven Greer (founder of the UFO Disclosure Project) in 2012. Greer claimed the figure was extraterrestrial. An initial analysis answered one question but raised others; it was not ancient—as had been assumed—but instead less than fifty years old. But was it human?

Benjamin Radford examines the "Starchild Skull" at the Roswell UFO festival.

Gary Nolan, professor of microbiology and immunology at Stanford University, recently examined the curiosity. As *National Geographic* reported:

> Nolan worked with genetic researchers at Stanford and with computational biologist Atul Butte's team at the University of California, San Francisco to analyze Ata's genome. According to their new study, mutations are present in seven of Ata's genes that are all involved in human growth. Nolan now thinks that this combination of mutations caused Ata's severe skeletal abnormalities, including her unusually rapid bone growth. He says that Ata is most likely a human fetus who was either stillborn or died soon after birth. ... Nolan thinks that someone cared for Ata when she died about 40 years ago. He points to the way she was carefully laid flat on the ground, wrapped in a leather pouch. (https://tinyurl.com/y9keyuol)

The article, "Whole-Genome Sequencing of Atacama Skeleton Shows Novel Mutations Linked with Dysplasia," was published in the March 2018 edition of the journal *Genome Research*. The abstract notes:

> The Ata specimen carried a strange phenotype—6-in stature, fewer than expected ribs, elongated cranium, and accelerated bone age—leading to speculation that this was a preserved nonhuman primate, human fetus harboring genetic mutations, or even an extraterrestrial. We previously reported that it was human by DNA analysis with an estimated bone age of about 6–8 yr at the time of demise. To determine the possible genetic drivers of the observed morphology, DNA from the specimen was subjected to whole-genome sequencing using the Illumina HiSeq platform with an average 11.5× coverage of 101-bp, paired-end reads … . Ata is a female of human origin, likely of Chilean descent, and its genome harbors mutations in genes … previously linked with diseases of small stature, rib anomalies, cranial malformations, premature joint fusion, and osteochondrodysplasia (also known as skeletal dysplasia).

Ata shows a number of rare mutations, and researchers suggest that the cause of the deformities might be exposure to nitrates, which are unusually high in the region because La Noria is a former mining town.

Long-dead bodies with deformed skulls have previously been mistaken for extraterrestrials, but there is nothing unusual about finding deformed skulls in the Americas; archaeologists have found them for years. Cranial deformation is a widely known practice, and in 2012 archaeologists in Mexico found a burial ground of twenty-five skeletons; of those, more

than half showed intentional skull deformation. In 2015, a pair of mummified cats found in Chile was mistaken for the chupacabra. The felines had disproportionately large heads compared to the rest of their bodies and were likely kittens. Part of the reason that these objects seem so bizarre and mysterious is that very few people outside of the fields of archaeology and anthropology are familiar with the process and appearance of mummification.

For most people, the word *mummy* evokes bandaged, slow-moving monsters from ancient Egypt. We typically think of bodies being reduced to a skeleton not long after death, but in fact bodies may be preserved for centuries or millennia, either through intentional preservation (such as mummification) or because the environment where a person died helps preserve the bodies (for example high in the cold Andes mountains or in deserts where the lack of moisture inhibits decay-causing bacteria). Adult mummies are strange enough, but baby mummies are even rarer and stranger looking. Because babies have disproportionally large heads compared to the rest of their bodies, their desiccated remains seem all the more inhuman.

Archaeologists digging near Mexico's Sonora desert have discovered what appears to be the burial ground of an early Mesoamerican society, including signs of deformed skulls. Deformed skulls found in Mexico have been offered as evidence for ancient extraterrestrial visitation. A child's deformed skull—later dubbed the "Starchild skull"—was found in the early 1930s in the arid region around Chihuahua. It was later sold to a UFO researcher who exhibited the artifact at UFO and paranormal-themed conferences for many years, claiming that it is too unusual to be fully human and is the offspring of an extraterrestrial male and a human female. Scientists, however, were skeptical; two sets of DNA tests (one in 1999 and another in 2003) confirmed that the skull was in fact human: a Native American or Mesoamerican male child who likely suffered from hydrocephalus, a condition that leads to skull elongation and deformation.

A common theme pervades mystery-mongering circles: anything not immediately explainable or obvious is interpreted as a baffling mystery, often with paranormal connotations. Thus, a strange object in the sky becomes a flying saucer; a mangy dead coyote becomes a chupacabra; and a deformed fetus becomes an alien hybrid. Science fiction speculation is fun but should not eclipse the real science and significance of these stories; truth is often stranger—and more interesting—than fiction. ■

Balles Critical Thinking Prize Awarded to Authors of *UFOs, Chemtrails, and Aliens*

With their book *UFOs, Chemtrails, and Aliens*, Donald R. Prothero and Tim Callahan not only refute false claims and misguided beliefs about supposed encounters with the extraterrestrial and paranormal, but more importantly they also arm readers with the tools they will need to fairly evaluate any extraordinary claim they come across. It is for this achievement—an accessible, enriching, and genuinely fun introduction to scientific skepticism—that Prothero and Callahan are awarded the 2017 Robert P. Balles Annual Prize in Critical Thinking by the Committee for Skeptical Inquiry.

UFOs, Chemtrails, and Aliens collects several notable instances of alleged alien contact, evidence of extraterrestrial spacecraft, and the shadowy means by which these events have been covered up. Prothero, a geologist and paleontologist, and Callahan, an artist and animator, unpack the elements of each case. With an approach that is conversational and sympathetic to the believer, the authors show why the evidence is never sufficiently extraordinary to justify the extraordinary claim.

"Critical thinking and science have proven to be the most consistent and effective methods of distinguishing reality from illusion," write the authors, who go on to show how several factors, including our often-deceptive senses and a sensationalistic culture, make us so susceptible to believe in that which is demonstrably false.

"As skeptics and science advocates, we can attempt to debunk outrageous and extraordinary claims until we're blue in the face, but that's almost never enough to change someone's mind," said Barry Karr, executive director of the Committee for Skeptical Inquiry. "What Prothero and Callahan show so clearly in this book is that we can inoculate ourselves from falling for hoaxes and submitting to fear and wishful thinking by learning the skills of critical thinking—by thinking like a scientist."

And thinking like a scientist doesn't require any advanced degrees or laboratory work. "What makes someone a scientist is not a white coat or lab equipment," write Prothero and Callahan, "but rather how he or she asks questions about nature and what thought processes he or she employs to solve problems."

The Robert P. Balles Annual Prize in Critical Thinking is bestowed by the Committee for Skeptical Inquiry, publisher of Skeptical Inquirer magazine and a program of the Center for Inquiry. Prothero and Callahan will receive the prize at the CSICon convention taking place October 18–21, 2018, in Las Vegas, which will also feature speakers such as Stephen Fry, Steven Pinker, James Randi, Richard Dawkins, and many more. See CSIConference.org for more information.

The Balles Prize is a $2,500 award given to the creator of the published work that best exemplifies healthy skepticism, logical analysis, or empirical science. The prize was established by Robert P. Balles, a practicing Christian, along with the Robert P. Balles Endowed Memorial Fund, a permanent endowment fund for the benefit of CSI. The winner of the 2016 Balles Prize was Maria Konnikova for her book *The Confidence Game*.

Cell Phone Radiation and Cancer

New NTP Results Inconsistent; Random Chance Likely at Play

CHRISTOPHER LABOS AND KENNETH R. FOSTER

The issue of cell phones and cancer is in the news again since the National Toxicology Program (NTP) study has released its results. Keeping track of the NTP results can be difficult. In 2016, they released the partial findings of their study (Report of Partial Findings 2016), which showed an association between cell phones and two types of cancer (cardiac schwannomas and brain gliomas). The full data was released in February 2018 (Wyde et al. 2018), and while the cardiac schwannoma association remained statistically significant, the brain glioma association was seen as more equivocal. Then in March, the NTP study results went through peer review where an eleven-member panel reviewed and voted on whether to accept or modify the study's recommendations. The peer review panel (Actions from Peer Review 2018) voted to label the cell phone cardiac schwannoma association as demonstrating "clear evidence" of carcinogenicity and the glioma association as showing "some evidence." (These reports are all online at the NTP website at ntp.niehs.nih.gov.)

Keeping track of this evolving evidence base can be confusing, and the NTP will issue a final report sometime this fall. But it's worth examining why different people can come to such different conclusions about the study's findings.

The NTP study was designed to expose rats and mice to different levels of radio frequency radiation (RFR). One group was a control group and three other groups were exposed to 1.5W/kg, 3W/kg, and 6W/kg of RFR. Researchers also tested two forms of signal modulation, reflecting two major access technologies employed by cellular telephones: Code Division Multiple Access (CDMA) and Global System for Mobiles (GSM). Both technologies transmit data in the form of modulated signals, but GSM is much less uniform in its power output than CDMA. Even though the average exposure level over time may be the same, hypothetically there could be a difference in biological effects, though there is no credible reason to expect any such differences.

Keeping track of this evolving evidence base can be confusing. But it's worth examining why different people can come to such different conclusions about the study's findings.

The rats and mice being studied had their entire bodies exposed to RFR for nine hours every day for two years. The exposure also started *in utero*, not at birth. The whole-body exposure levels were far above the whole-body exposure limits for humans but were comparable to exposure limits set for very small regions of the body near a cell phone antenna. Consequently, the animals were being exposed to RFR in a way that is very inconsistent with the actual exposure to a human user of a cell phone, both in the particulars of exposure and duration of exposure. Notwithstanding these limitations, it is worth looking at what the data actually demonstrated.

The association between malignant gliomas and cell phones has been of primary interest, and it's the one conclusion that has been subject to the most revisions. The idea that cell phones may cause brain cancer is not a new concern. The INTERPHONE series of studies (interphone.iarc.fr) is often cited as supportive evidence for this association even though the actual conclusions of the study were that "no increase in risk of glioma or meningioma was observed with use of mobile phones." There was one statistically significant association though. Those who used their cellphones most (defined here as the top 10 percent of users) seemed to have an

increased risk of glioma. But the authors noted that there were "implausible values of reported use in this group" and that bias and error in the measurement prevented a causal interpretation. Accurately measuring RFR exposure over years is extremely difficult. The combination of weak (and generally negative) results, coupled with the difficulty of accurately measuring exposure, has led health agencies to consider this evidence unpersuasive one way or the other.

Therefore, the results of the NTP were particularly eagerly anticipated. The NTP study did show an association between RFR and gliomas. However, the association was seen only in rats and not in mice. Also it was seen only in male rats and not female rats. Finally, it was seen with CDMA signal modulation but not the GSM signal modulation.

There are some important limitations to this analysis. Notwithstanding the obvious issue that animal studies do not necessarily translate to humans, it is hard to understand why the association would only be true in male rats and why it would only be true with one type of signal modulation. It is also worth noting there were very few cases of malignant gliomas in these animals. For the animals exposed to CDMA RFR, only the male rats showed an increase in gliomas—not the female rats or mice of either sex. The male rats exposed to CDMA RFR at 6W/kg had three malignant gliomas, compared to none for those exposed to 3W/kg, 1.5W/kg, or unexposed controls. For GSM RFR the 1.5W/kg, 3W/kg, and 6W/kg groups developed three, three, and two gliomas, respectively. Given the very small numbers, it becomes important to consider the possibility of random chance. A scientist would consider these results to be very fragile—if one animal in the control group had developed glioma (which is consistent with historical data for that species), the association would disappear statistically.

When it comes to cardiac schwannomas, the results are more consistent in that the association was seen for both forms of signal modulation, CDMA and GSM. But again, the results were seen only with male rats and not female rats, male mice, or female mice. Schwannomas are tumors arising from Schwann cells that produce the myelin sheath around peripheral nerves. Schwannomas are interesting because they are histologically similar to acoustic neuromas. Some studies have suggested a link between acoustic neuromas and cell phones (Hardell et al. 2013); other studies do not (Pettersson et al. 2014). Again, the results are fragile, and the evidence base is somewhat inconsistent.

Thus, any evidence linking RFR to cardiac schwannomas would seem to be possibly supportive of this link given the similarity of the tumor types. However, it is worth remembering that the rats had their whole bodies irradiated with RFR, and it is not immediately obvious why schwannomas would preferentially appear in the heart. In fact, they could have (and did) appear in any organ. Consequently, when you look at all schwannomas, not just the cardiac schwannomas, there does not appear to be a significant relationship to RFR. Therefore, for the schwannoma analysis to be positive you have to ignore the whole-body results and focus only on the cardiac findings.

Reconciling the disparate data has been made harder by the just-released study from the Ramazzini Institute in Bologna (Falcioni et al. 2018), which was rushed to publication after the NTP results were made public. This paper presented the results of a long-term rat study that suggests an increase in heart schwannomas in rats exposed to RFR. These data are hard to reconcile with the NTP. First, they used exposures about 1,000 times lower than in the NTP study, which would argue against a dose-response effect where more RFR is worse. While dose-response effects are not mandatory in science, it is difficult to understand how low and higher doses of RFR could be equally dangerous. The Ramazzini also diverges from the NTP in another way: the cardiac schwannoma association was only seen in male rats and not female ones, which makes these results far less consistent than has been reported in the media. Finally, the Ramazzini found no evidence that RFR was linked to neoplastic lesions of the brain. They claim that there was a nonsignificant trend, but this occurred in female rats as opposed to the male rats that were seen in NTP. All we can say for sure is that the NTP and Ramazzini studies are not entirely supportive of each other nor have they "settled" matters.

The rats and mice being studied had their entire bodies exposed to radio frequency radiation for nine hours every day for two years. The animals were being exposed to RFR in a way that is very inconsistent with the actual exposure to a human user of a cell phone.

Given that the results are not consistent across or even within species, one must ask whether the results of the NTP could be due to chance alone. Given the small number of tumors that occurred in each group, random chance could have a significant role in these findings. We often fail to appreciate just how important random chance can be in statistical analyses. The ISIS-2 study offers up a perfect example (ISIS 1988).

The ISIS-2 study demonstrated that giving aspirin to patients after a heart attack improved outcomes. However, even though the study was overall positive, one subgroup of patients showed no benefit. That subgroup was patients born under the zodiac signs of Gemini

and Libra. In fact, the authors of the ISIS-2 study purposely highlighted this rather ludicrous and totally spurious statistical finding to demonstrate that "all these subgroup analyses should be taken less as evidence about who benefits than as evidence that such analyses are potentially misleading."

In the NTP study we have a similar problem. Remember that there were four groups of animals, which were tested against two types of signal modulation and evaluated for many different types of cancer including heart, brain, pituitary, adrenal, liver, prostate, kidney, pancreas, mammary gland, and thymus cancer among others. Thus, you have dozens of statistical analyses being run across all these many subgroups. The NTP study was an exhaustive analysis, but that thoroughness and the multiplicity of tests that were run means that you must expect some false positive results due simply to chance.

Most statistical tests are based on the assumption that you have a 5 percent false positive rate, represented by 1 - 0.95 = 0.05, or 5 percent. However, if you do two analyses the chance of at least one false positive is $1 - 0.95^2 = 0.0975$, or 9.75 percent. Do five analyses and the chance of at least one false positive is $1 - 0.95^5 = 0.23$, or 23 percent. Do thirty analyses and the chance of at least one false positive is $1 - 0.95^{30} = 0.79$, or 79 percent.

Therefore, the more tests you run in your study, the more likely that you will generate a false positive. And the NTP study ran a lot of tests. Consequently, they are very likely to have had false positives. Studies such as this are essentially fishing expeditions or data mining with no single hypothesis that is being tested, and it would not be surprising if the increase in heart schwannomas were just a random event.

There are statistical ways to deal with this type of multiple hypothesis testing. The Bonferroni correction is one technique that is sometimes used, and it basically amounts to using smaller p-value cut-offs the more tests you run. You basically divide 0.05 by the number of tests you intend to run. So if you perform two tests, then you should use a threshold of 0.05/2 or 0.025. If you run ten tests, then your threshold should be 0.005, and so on. The NTP study did not adjust for multiple testing.

All we can say for sure is that the NTP and Ramazzini studies are not entirely supportive of each other nor have they "settled" matters.

The inherent weakness of the NTP results is their lack of consistency. We see a signal for harm in rats but not mice. We see a signal for harm in male rats but not female rats. We see a signal for schwannomas in the heart but not the rest of the body. Finally, the rats exposed to RFR actually lived longer on average than the controls. So do cell phones cause cancer while simultaneously extending survival? It is not impossible that there is some yet to be fully understood mechanism at play, but at this point random chance seems far more likely. ■

Note

The NTP study is a good case history of the problems of data dredging. For more on this, see Kenneth R. Foster and Joseph Skufca, "The Problem of False Discovery," *IEEE Pulse*, March/April 2016, available online at https://www.dropbox.com/s/4echhc6ez6pyn60/Foster_Skufca_2016.pdf?dl=0. and Stuart Vyse, "Moving Science's Statistical Goalposts," Skeptical Inquirer, November/December 2017, available online at https://www.csicop.org/si/show/moving_sciences_statistical_goal_posts.

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Gullible Reporting about ESP on CBS

STEVEN NOVELLA

In the 1970s and 1980s, belief in the paranormal was the most common target of skeptics. Topics such as extrasensory perception (ESP), astrology, and faith healing were at the top of the list of skeptical concerns. In the past thirty years, skepticism has evolved quite a bit, and while we never stopped being watchdogs on paranormal beliefs and other pseudoscience, they did mostly fade into the background. Other topics, such as science denial and the rise of fake news, took center stage.

But history has shown that there is often a cycle to such things. Interest in UFOs has waxed and waned over the years, for example, never going away completely but fading and then rising again to prominence as a new generation discovers the topic.

Still, we do like to think we are making some progress through exposure and education. We have tried to interact frequently with the press so that at least the skeptical point of view will get better exposure when such topics are addressed. One solid victory was when the BBC announced they will no longer follow a pattern of false balance when dealing with science denial—putting a crank up against the consensus of scientific opinion as if they were equal.

A recent segment of CBS's *Sunday Morning* about ESP, however, was worse than false balance; it was a throwback to the early days of credulous reporting about the paranormal with only token skepticism. Not that token skepticism is gone, but it has become more rare, especially from a major network or news outlet.

The piece, by Erin Moriarty, is a complete journalistic fail. It was the kind of piece we used to see thirty-plus years ago before the skeptical movement had any traction. It is a perfect example of what we call token skepticism—a piece that is utterly gullible except for a very brief talking head skeptic who says

The piece, by Erin Moriarty, is a complete journalistic fail. It was the kind of piece we used to see thirty-plus years ago before the skeptical movement had any traction.

something generic, such as, "There is no scientific evidence to support this." The token skepticism is immediately negated, however, by some response from the true believer, a response the skeptic is never allowed to respond to in turn.

This is the kind of piece I used to complain about to reporters or producers, who would then respond, "We are just going to let the audience decide what to believe." In other words, we are going to completely misinform our readers/viewers, give them a profoundly misleading overview of the topic, and fail to provide any scientific information and just let them be their own skeptics, which in turn is just a face-saving justification for, "We are going to brazenly pander to beliefs we know are not true because it's better for ratings."

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Here are some specific examples of Moriarty's utter failure. She opens her piece with Uri Geller, the famous spoon bender from the 1970s. She shows him performing his various "psychic" parlor tricks. Then, in what she probably thought was "balance," she mentions that his powers were "unreliable," showing that famous clip from *The Tonight Show Starring Johnny Carson* when Geller completely failed.

This is the classic defense of ESP true believers—evidence that ESP is not real is instead presented as evidence that ESP is simply quirky and unreliable, which is already part of the ESP narrative and is hardly taken as a criticism. What Moriarty failed to show is that James Randi, who knows how Geller does his parlor tricks, told Carson how to arrange the demonstrations so that Geller could not cheat.

The Carson segment was not evidence that Geller's powers were unreliable but evidence that Geller does not have ESP at all and instead uses simple magic tricks to fake ESP. You would not know this from watching Moriarty's hack piece, however.

The main part of the segment covered "Project Stargate," a U.S. government program to test whether or not ESP could be used for espionage. To tell the story of Project Stargate Moriarty goes to … Dean Radin. That's right, a crank true believer in ESP. Going to a crank outlier as the expert is an absolute hallmark of this type of gullible reporting. Radin predictably states that the program "worked."

What Moriarty fails to inform her viewers is that the project was in fact deemed an utter failure. She just notes that it was "shut down" but does not mention that it was shut down because after a decade and millions of dollars, they had nothing to show for it.

The project *did not work*—it was a complete failure and, in fact, is good evidence that ESP either does not exist or is so weak and unreliable as to be useless.

The project focused mainly on remote viewing because that is what spies would like to do. The "gifted" people they examined could not produce results that were distinguishable from chance. It is one thing to do a demonstration in a controlled environment where you can cheat; it is another to produce real-world, actionable results. Any "hits" that they had were rare and random, the kind of chance hits you would expect from a decade of research.

But of course you can focus on those random hits as if they are representative and let the alleged psychics be the ones to tell their own gullible story. Focusing on the hits, ignoring the misses, and failing to put the data into any scientific context is what pseudoscientists—and pseudojournalists—do.

Moriarty ends with a demonstration with Dean Radin in which she looks at pictures, some emotional and others neutral, to see if her pupils dilate prior to seeing an emotional picture, which Radin claims is evidence of precognition. Unsurprisingly, it turns out that Moriarty is psychic, and her pupils dilated five seconds prior to an emotional image.

This is a great noisy setup for generating false correlations. Just keep collecting data until you have a chance correlation, then focus on that. These setups are also easy to p-hack if you want to get published. Real rigorous controls, however, always make any alleged effect disappear.

The whole piece was profoundly disappointing. It's not as if there isn't an entire community of skeptics out there with useful information and insight at their fingertips. This is all really old territory.

I don't know if Moriarty is a true believer. What is most likely is that she is just an old-school journalist who thinks of paranormal pieces as "fluff" pieces that don't require journalistic rigor. You can just lazily let the cranks and believers make their sensationalist claims, have a token skeptic for plausible deniability, add a little superficial disbelief of your own to put yourself in the role of "skeptic," and you're done. This identical piece could have aired literally thirty years ago with no change.

But there is one thing that is clearly different today. At least we now have social media (for all its ills) to call out journalists when they produce such dreck. ■

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CBS *Sunday Morning* Seers Don't See So Well

JOE NICKELL

On March 18, 2018, *CBS Sunday Morning* featured an insufficiently skeptical segment, "ESP: Inside the Government's Secret Program on Psychic Spies."

One of the psychics presented—Angela Ford (formerly Angela Dellafiora)—is described as a former Pentagon Project Stargate "psychic spy." She recalled one of her best assignments in which, allegedly, she psychically tracked down fugitive drug smuggler Charlie Jordan in 1989. Reporter Erin Moriarty simply takes Ford at her word and gushes, "There is no obvious explanation for how Ford obtained the intel that turned out to be accurate." But was it really accurate?

Actually, the Stargate project's final report found "reason to suspect" that in "some well publicized cases of dramatic hits" the psychics might have had "substantially more background information" than might otherwise be apparent. Just such criticisms are raised by the Charlie Jordan case and the involvement of Angela Ford. (I was asked to look into the case for the BBC series *Mysteries*, which aired November 23, 1998. See also my investigative report in the March 2001 *Skeptical Briefs*, online at https://www.csicop.org/sb/show/remotely_viewed_the_charlie_jordan_case.)

Ford—who has many of the traits associated with a fantasy-prone personality—was not practicing the typical "remote viewing" (RV) used by the other Stargate psychics. Whereas that was basically clairvoyance by a new name, what Ford did was to enter a "trance" and let her "spirit guides" manipulate her hand to produce written responses to questions. While her automatic writing technique came to be called "written RV," it was really just old-fashioned spiritualism.

While claimed psychic Angela Ford's automatic writing technique came to be called "written RV," it was really just old-fashioned spiritualism.

Not surprisingly, Ford's information was often wildly erroneous, as in the search for Lt. Col. William Higgins, who was held hostage by terrorists. Ford envisioned him alive, in an underground location, and about to be released, whereas he had probably been kept in a Lebanese house before his tortured corpse was recovered.

Allegedly, Ford said fugitive Charlie Jordan was in Wyoming at "Lowell" near an "Indian burial place." Now, police had independently spotted Jordan's vehicle outside Denver, apparently heading toward Wyoming. There is no "Lowell" in that state, and *Lovell*, Wyoming, has no Native American burial site. While there is such a site at Pinedale—where Jordan was arrested—Pinedale is over 300 miles from Lovell. So it looks like Ford may have been advised about Wyoming and later engaged in what is known as "retrofitting" (after-the-fact matching of details). Then word of mouth transformed the story into a folktale.

While *Sunday Morning* could have been more skeptical, their guest, writer Annie Jacobsen, did conclude about the psychics: "There's instances of unusual situations, but there is no proof. It does not pass scientific muster." ■

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The Anatomy and Pathology of Jihad

VANNI CAPPELLI

The Halloween 2017 terror attack in New York brought forth the usual affirmations of courage and resilience amid the sorrow, though these have been joined by a growing sense of frustration that the United States is not making progress in its struggle against Islamic extremism. Such confusion stems from the fact that Americans are far more capable of facing the effects of this resistant pathology than they are of looking into its causes.

While discussing his book *The Righteous Mind* with Bill Moyers on PBS in early 2012, social psychologist Jonathan Haidt lamented how what he called the "sacralization" of social entities, ranging from victim groups to America itself, impedes rational, honest, and creative thinking in our angry age.

"Whenever you sacralize something, there you will find ignorance, blindness to the truth, and resistance to evidence," Haidt said. Citing an example, "American foreign policy did contribute to 9/11, but you can't say that because people on the Right will see that as sacrilege."

We are more than half a millennium into an intellectual evolution in the Western world in which the Italian Renaissance freed history and politics from divine determination, the Scientific Revolution established an empirical and inductive approach to reality, and the European Enlightenment won freedom of thought. One should be able to say anything that proceeds from a comprehensive presentation of evidence, a rigorous analysis of these facts, and rationally defensible conclusions drawn from such an interpretation. This ability to think critically and speak freely is all the more vital amid an ongoing crisis characterized by repeated mass casualty terrorist attacks, prolonged and devastating wars, and persistent threats to national and international security.

Yet nearly seventeen years since September 11, long after the natural cognitive dissonance provoked by such an experience should have cleared, Americans are, as Professor Haidt pointed out, still drifting in a mental fog on this subject reminiscent of pre-modern modes of thinking. It remains very difficult to talk about the conflict with jihad as anything other than a Manichean battle of good versus evil or to analyze it objectively within a detailed context of the United States' historical engagement with the Muslim world.

This crippling of the critical faculty by considerations of an almost theological correctness has greatly inhibited Americans' understanding of the nature of Islamic extremism and the United States' relation to it, contributing to the length and inefficacy of the wars that have been waged against it. We would do well therefore to remember what have been the effects of such suppressions of debate in the past and the beneficial results when they were overcome.

The classic example of truth impeded by a sacred mind-set is the resistance to the heliocentric system of Nicolaus Copernicus and the persecution of its greatest champion, Galileo Galilee. However, amid a continuing attack upon the body politic by a phenomenon that is habitually referred to in metaphors of disease, the history of the understanding of celestial bodies is not as revealing as that of human anatomy and pathology.

Throughout the Middle Ages, the unquestioned authority on these subjects was the Greek scientist Galen, though he never dissected a human body and merely repeated Hippocrates's belief that diseases are caused by an imbalance of "humors." Relying on animal dissections and speculative analogies, he could not know what was underneath the human skin or how it worked because he had never seen it or even tried to look there. Even when the taboo against intrusive postmortems weakened, if anatomists found anything at variance with Galen, they simply disregarded it—until the advent of a genius who believed that life was all about "knowing how to see": Leonardo da Vinci.

As the medical writer Sherwin B. Nuland explained in a probing life of

this polymath that focused on his anatomical researches, Leonardo's radical empiricism, though not entirely free from bias, caused him to regard the work of earlier experts as "teachings to be tested and challenged rather than teachings to be accepted and verified." Vowing to "begin with the experience and by means of it investigate the cause," Leonardo set dogma aside and plunged into experiment. Over the course of decades of objective study, Leonardo systematically dissected dozens of cadavers, saw what was actually there, came to understand how organs functioned within the system of the human body, identified diseases such as arteriosclerosis, and set it all down in dynamic drawings explicated by a brilliant text.

With time, his methods were followed by Andreas Vesalius, William Harvey, and all those who have ever contributed to the rational miracle that is modern medicine.

How would the struggle with Islamic extremism look if subjected to Vincian scrutiny? How would such contrasting assertions as "Intolerance is basic to Islam," "Only a tiny fraction of Muslims are violent," "Jihad is a cancer that has metastasized," or even the great taboo, "American foreign policy contributed to 9/11," stand up against a body of evidence that was analyzed on the basis of "knowing how to see" and not cherry-picked to prove them?

This change in method would have to begin with a working knowledge of the actual tenets of Islam, and the trajectory of political developments in the Muslim world since the fall of the Ottoman Empire at the end of World War I placed it in direct contact with modernity. It would need to recall that most countries in the region sought secular bases of legitimacy over the past century, with the crucial exceptions of Saudi Arabia and Pakistan, and that both have been treated as vital American allies for nearly seventy years. The religious ideologies that guide their rulers would have to be examined in detail, along with their socioeconomic motivations. Islamic extremism in words and deeds would have to be assessed in terms of its state-level or non-state origins, sources of support, and patterns of diffusion. Finally, the policies of the United States and these allies in the Soviet-Afghan War, during which the most extreme Islamist groups received the lion's share of aid and were then allowed to continue unmolested as Pakistani proxies after America withdrew from the region, would have to be objectively analyzed, as well as their historical effects.

Most American government officials and foreign policy experts would counter that all this has been done for decades and agree with counterterrorism blogger Robert Chesney that "both the Bush and Obama administrations cared a great deal about trying to find ways to prevent radicalization, and if anyone knew how to actually 'block the pathways' in a reliable and scalable way it would have been done long ago."

Yet this sanguine assertion ignores the powerful psychological prejudices that Prof. Haidt addresses. The motives for rejecting or suppressing evidence about the origin, spread, and nature of Islamic extremism are legion. Among them are sheer foreign policy orthodoxy, threats to vested interest groups, the difficulty of the proposed policy changes, a resistance to national self-examination, the perceived need to maintain America's image intact, and, most importantly, a profound fear of a backlash: "You can't say that."

However, a great nation at war is in no more of a position to be held back by such taboos than is a physician seeking to treat a serious illness or a patient in denial that such a serious condition exists. No ideas based on fact and logic have ever been intrinsically daring; they are only daring in a hostile social and psychological environment. What is desperately needed amid this unending struggle with jihad is not bias-appeasement or face-saving but truth-seeking and problem-solving, regardless of their emotional or practical difficulty. And the urgency for such openness grows with each new terror attack.

The ability to think critically and speak freely is all the more vital amid an ongoing crisis characterized by repeated mass casualty terrorist attacks, prolonged and devastating wars, and persistent threats to national and international security.

An unfettered discourse on Islamic extremism and the United States' relation to it holds forth the promise of a comprehensive fresh view of the matter that would yield a comprehensive new strategy that effects a cure. We might well emerge from such a free and open debate as blameless knights in a contest with dragons or conclude that the fault is not in our stars but in ourselves—or any of the many shades in between.

Only we must be able to say it. ■

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Secrets of 'The Flying Friar': Did St. Joseph of Copertino Really Levitate?

Supported by records citing eyewitness testimony, St. Joseph of Copertino was a seventeenth-century religious marvel who laid claim to the power of levitation. Reportedly, as stated by the title of a new book by Michael Grosso (2016), he was *The Man Who Could Fly*. Although I had addressed both the topic of levitation and Joseph himself briefly in a book (Nickell 1993, 211–216) as well as in a BBC television documentary ("Secrets" 1999), I determined to look more deeply into the strange life of "the flying friar."

Future Saint

Born Joseph Desa in the Italian village of Copertino (or in English Cupertino), he lived his sixty years (1603–1663) during a superstitious period that included the European witch obsession. Joseph—whose father had fled to avoid debtor's prison and whose mother gave birth to him in a shed—was thought stupid. As a boy he loitered at churches and—though always apologizing for fits of reverie—was taken in at a Capuchin monastery. There he prayed on his knees so often and so long (a habit that would later prove useful in his "levitations") that his knees became infected. When his trying to operate on them himself led to a lengthy convalescence, he was thought worthless and was dismissed.

Nevertheless, with some help from his mother, he joined the Order of Conventuals in 1625 and, three years later, became an unlikely priest. (He was aided by a stroke of luck: the bishop who was to administer the final exam was called away and so waived the test!) Already given to long meditations, Joseph often yielded to fits of ecstasy—emotional outbursts that began to prompt talk about him and even to herald certain mystical phenomena reported around him (Grosso 2016, 15–23).

St. Joseph of Copertino is lifted in flight at the site of the Basilica of Loreto, by Ludovico Mazzanti

The superstitious believed Joseph was able to divine the thoughts of others, to effect cures, to engage in combat with the devil (at least in a story he himself told), to have the supposed power of bilocation—that is, to be in two distinctly different places simultaneously—even to miraculously multiply food, like Jesus (Dingwall 1962, 23). But it was the "levitations"—which only began with his ordination as a priest in 1628 and therefore seem contrived—that secured his evolving notoriety and ultimate legacy.

Subsequently, Joseph's wonder-working increased, becoming "more frequent and more dramatic." He attracted crowds and was taken on tour by a ruling prelate, where he impressed the credulous as a prophet, a healer and exorcist, and an ecstatic. He had also begun his "levitations" and had become in effect "the reluctant star of a traveling spiritual circus," whereupon he came to the attention of the Holy Inquisition. He was accused of being ostentatious and of having "affected sanctity," but after two years he was found innocent. Rome later sent him into a sort of exile, away from public exhibitions (Grosso 2016, 23, 24, 26–28). He was at Grotella for sixteen years and lived the last six at Osimo.

In time, the prelate who had taken the friar on tour would tell Roman authorities, "I can say nothing except that he was a saint who went into ecstasy and was adored by everybody" (Chiappinelli 2008)—hardly a ringing endorsement of one who purportedly flew like a bird. Another, a traveling companion to Joseph for years, suddenly requested to be sent away from him (Grosso 2016, 29)—a mystery that seems to bespeak some dark secret, possibly knowledge of deception.

Performance Art

What Grosso calls Joseph's "strange performances" do indeed seem to reveal him as a "performance artist" (Grosso 2016, 72, 165). They were especially common during his dramatic, lengthy Mass (that could last up to four hours). In what I suspect was feigned entrancement, his ecstatic state would render him immobile as a statue, his body perhaps taking on the form of a cross. Then he would seem to "rise and float." I would wager that he mimed this by stretching himself upward until he artfully stood on tiptoe, then danced lightly in place so as to create the illusion of "hovering" just above the ground.

He might then begin to "fly"—or leap—about, as he himself described it, "like a small bird in a cage when it can get out and fly away." On occasion, he would soar (bound through the air) to some elevated perch. (These flights were his greatest feats, as we shall see in the following section.)

Around Good Friday, certain odd movements of his body might occur, as if caused by an invisible power: he would be flung down, lifted up, shoved forward, or jerked back. Sometimes when he came to break the host (the consecrated wafer), it would become (or so he would act out) incredibly heavy or impossibly resistant, whereupon he would fall down heavily and then, weeping on his knees (seemingly a prerequisite for what followed), supposedly "levitate backward."

For instance, during a Duke's visit Joseph began to wail, then gave a great scream and flew into the air *backward in a kneeling position* (original emphasis, Bernini 1722, 85). But did he simply spring backward? Details are too unclear: Did kneeling become crouching and afterward a crouch return to kneeling—the truth concealed by the friar's tunic? In other instances, details are also important. Bernini (1722, 30) in one instance describes Joseph "now going to the altar, *jumping onto* the last step of the pulpit" (emphasis added). (For all of this, see Grosso 2016, 71–76, and his own sources.)

Once, some talented young singers were brought to Joseph's room to perform for him. Their singing sent him into such ecstasy that he fell on his knees, then rose and floated just above the ground. In confirmation, the three boys "put their hands between Joseph's tunic and the ground" (Parisciani 1963, 443). Readers might want to pause here to consider what I will explain as a probable trick in the next paragraph (assuming the account is not merely hearsay and embellishment).

Because of Joseph's station, the boys would have been compliant, not aggressively skeptical. Note that the friar's feet are never mentioned, indicating that he rose while still apparently kneeling. But recall my earlier suggestion, regarding the "backward levitations," that Joseph could subtly move from kneeling to a pre-crouch position by placing the bottoms of his toes flat on the floor. As he then moves *slowly* into a crouch using his well-developed muscles (you see where this is going), the still-apparently kneeling friar is witnessed rising upward—or rather his knees are seen to rise, giving that illusion. The rest is child's play, literally. The boys are invited to place their hands between the tunic and the floor. It would probably not occur to them to reach far back and search for the actual placement of Father Joseph's feet.

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The Levitations

Now let us examine some of the more extreme defiances of gravity that Joseph supposedly accomplished. That he could stand on tiptoe and even seem to slightly rise and hover may only indicate wonderful strength, balance, and acting; I suspect such acts were fundamentally stunts that may have led credulous seventeenth-century peasants to believe it was accomplished by levitation. (After all, there were numerous "levitating" saints before Joseph, a partial list naming fifteen [Smith 1965, 37, 38; see also Rogo 1982].) Thus, the witnesses would, in all good faith, unintentionally exaggerate what had actually happened.

Let us start with an incident in which Joseph "flew" to the feet of a statue that stood more than a man's height above the ground; there he adored it while "floating midair" (Grosso 2016, 81–82). In fact, all the time he "embraced" (i.e., held onto the feet of) the statue! Perhaps with muscular ability he extended his body horizontally to add to the effect.

A more significant example is a story told in the first biography of the friar (Bernini 1722, 150). A priest walking with "Padre Giuseppe" (Father Joseph) had mentioned the beautiful sky when, suddenly:

> These words seemed like an invitation for Padre Giuseppe to fly up into the sky, and so he did, letting out a loud cry and bounding from the ground to fly up to the top of an olive tree when he landed on his knees on a branch that kept shaking … as though a bird were perched on the branch. Padre Giuseppe stayed up there about a half hour … .

Note the use of the word *bounding*[1] plus the fact that olive trees are typically of low height (described as "short" and "squat" ["Olive" 2017]). Remember too that Joseph was practiced in kneeling for long hours. Besides, bounding upward was one thing, but after coming out of his supposed rapture he had to have help getting down! So the other priest fetched a ladder for the catlike friar.

Another example is also instructive. The account (Bernini 1722, 26) quotes a deposition by some shepherds (who were probably illiterate), apparently given years later. Father Joseph was dancing excitedly in the name of the church, when he:

> … suddenly sighed and loudly screamed and flew up in the air like a bird, halfway to the ceiling, where he *continued dancing above the main*

altar, and went to embrace the tabernacle that was a considerable distance above the main altar. This was all the more marvelous because the altar was filled with flaming candles and he rested between the candles without knocking over even one. He stayed that way with his knees above the altar, embracing the tabernacle with both arms, for about fifteen minutes … .

The still-apparently kneeling friar is witnessed rising upward—or rather his knees are seen to rise, giving that illusion. The rest is child's play, literally.

It is apparent from his movements that he bounded, in increments, onto the altar where he "rested between the candles"—that is, on the *support* that held *them*. And there, for the several minutes duration, he was "embracing"—in other words, holding onto—the tabernacle (which contained the Eucharist). He was never simply *floating* in air, as sources may seem to imply.

Conclusions

Not only do the accounts indicate Joseph's most dramatic aerial traverses were launched by a leap—not by a simple slow rising while merely standing or kneeling (Smith 1965, 49)—but, moreover, I find that they appear to have continued as just the sudden arcing trajectories that would be expected from bounding. They were never circuitous or spiraling flights like a bird's. Invariably, Joseph's propulsions began with a shout or scream, suggesting that he was not *caused* to leap by some force but *chose* to. Analogous to martial artists who yell when executing some technique (like breaking a board with their hand), his cry may have been to help him focus and commit to the act and so dispel fear. It might also have served to turn all eyes on him. He might have found that if he yelled not when he first started moving but only the instant before he left the ground people would be more likely to think they saw him simply rise up.

Grosso (2016, 80) gushes that the duration of Joseph's levitations—from only seconds to fifteen or thirty minutes or more of "sustained floating"—"seem to point to the reality of an unrecognized force of nature." Certainly, he insists, they were "enough to render implausible the claim that they were tricks of perception." Yet our analysis revealed that Joseph did not hover in the air but, after rapidly ascending, he then *rested* on some support such as a tree limb or *held onto* some fixed object such as a statue. In other accounts, such details may have been left out because the narrator was simply relying on his impressions.

Eyewitnesses are fallible, as we know all too well. People insisted they *actually* saw what they thought they saw—or they remembered much later what they believed they had seen, minus, for example, in some instances, the friar's initial rushing forward before actual lift-off. Moreover, the canonization (saint-making) process itself, requiring evidence of miracles, could well have fostered some pious exaggeration on the part of a late beloved friar's brethren and flock. There is also the "gross exaggeration" of biographies that were published more than half a century after Joseph's death.[2] Also, as a practical matter, the original records that led to his canonization are no longer available for study (Smith 1965, 48–49).

Today, I think few would be deceived by witnessing such feats—though we might well be impressed by the acrobatics. Certainly most of us, understanding gravity, will not expect to see actual levitations or flying—although there are the tricks of magicians and fakirs (Nickell 1993, 183, 211–216; 1995, 29).[3] Even now, however, we can marvel at the flights of basketball players like "Doctah" Julius Erving, who "added razzle-dazzle acrobatics to the game, and was the first to spend seemingly endless moments in the air, levitating toward the basket." Although Michael Jordan would become the master of this feat, being dubbed "Air Jordan," in fact "the Doctah supplied the original formula" (Musiker 2008, 24–25). If we can be so impressed in the twenty-first century, imagine such effects in the superstition-ridden seventeenth, and I think we can begin to understand the "levitations" of "The Flying Saint." ■

Notes

1. Hence, the noted Anglican haigiographer Baring-Gould (1914, 297) used the phrase "extraordinary bounds," and Smith (1965, 48) extrapolates "that St. Joseph appears to have been a gymnast." (For an opposing view, see Rogo 1982.)

2. Grosso's most-used source for the levitations is Bernini, whose 1722 text appeared nearly six decades after Joseph's death.

3. Although I do not suggest Joseph used one, springboards were available since the Middle Ages to propel acrobats ("History" 2018).

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The Enduring Legend of the Changeling

In March 1863, a New York City coroner held an inquest on the death of a three-year-old child living on Eighty-Third Street between Eleventh and Twelfth Avenues. As reported in the *New York Times*, Mary Nell, the child's mother, had been told by a previous tenant that there were fairies about in the house where she lived, and growing up in Ireland she had learned this was a sign that a child in the household had been exchanged for a fairy child.[1] The prescribed test for a suspected changeling was to heat the blade of a shovel until it was red hot and have the child sit on it. If a fairy child had been substituted for the true child, it would fly away. Mary Nell performed this test on her child (gender not specified) without her husband's knowledge, and the resulting burns were so severe that the child died a week later. Mr. Nell testified that "for some time past he had occasionally thought his wife was insane, she acted so strangely." The coroner decided to hold the mother in custody until the question of her sanity could be determined.

There are few events in life more anxiously anticipated than the birth of a child. The arrival of a healthy baby brings the prospect of happy years ahead and the fulfillment of many parental dreams. But childbirth has never been an easy passage. Prior to the twentieth century, both maternal and infant death were common, and after they arrived, children frequently succumbed to disease. Half of Martha Washington's four children lived to the age of five, and only one of Mary Todd Lincoln's four children achieved the age of twenty. Although in much of the world today maternal and infant mortality are less of a problem than they once were, many children continue to be born with abnormalities and developmental problems that profoundly alter their parents' expectations.

Because the fear of stolen children was so rampant, many precautions were proposed for warding off demons and trolls and preventing the theft of a child.

The story of the changeling is said to be pre-Christian in origin, but many of the best written sources come from the late middle ages. An early mention of the phenomenon is found in the writings of William of Auvergne, who was Bishop of Paris from 1228 to 1249. According to Auvergne, children of incubi demons were exchanged for mothers' healthy babies, and the changelings were discovered to have symptoms very similar to what today we would call "failure to thrive": "They say they are skinny and always wailing and such milk-drinkers that four nurse maids do not supply sufficient milk to feed

The devil steals a baby and leaves a changeling behind. Detail of *The Legend of St. Stephen* by Martino di Bartolomeo, early fifteenth century.

one. These appear to have remained with their nurses for many years, and afterward to have flown away, or rather vanished" (cited in Green 2016, 114).

Stolen babies were the subject of common legend in England, Germany, and Scandinavia, and both Martin Luther (1483–1546) and the Grimm brothers reported cases of changelings (Ashliman 1997). The changeling legend was integrated into Luther's Christian belief, and as a result, counterfeit children were said to have been left by the devil. Other traditional versions of the myth implicated witches, fairies, elves, incubi, succubi, trolls, water spirits, dwarves, or demons. Changelings were also described in the *Malleus Maleficarum* (*Hammer of Witches*), a popular manual on witchcraft, the original 1486 edition of which was written by

German Catholic clergyman Heinrich Kramer (Kramer and Sprenger [1484] 1928). The *Malleus Maleficurum* advocated the extermination of witches and had a profound effect on witch hunting and the torture and murder of women. For almost two hundred years, it was the second most popular book in Europe after the Bible (Guiley 2008).

The case of the changeling has been a remarkably popular subject in art and literature. The Irish poet W.B. Yeats made reference to the legend in his 1889 poem "The Stolen Child," which includes the repeated refrain:

> Come away, O human child!
> To the waters and the wild
> With a faery, hand in hand,
> For the world's more full of weeping than you can understand.

Fictional accounts of changelings have been written by Swedish Nobel Prize–winning author Selma Lagerlöf (*Bortbytingen*, 1915) and contemporary American novelist Victor LaValle (*The Changeling*, 2017). A 1980 horror film *The Changeling* starred George C. Scott under the direction of Clint Eastwood, and the 2008 Academy Award–nominated film *Changeling* starring Angelina Jolie (also directed by Clint Eastwood) was based on the highly publicized late-1920s Los Angeles case of Christine Collins, whose nine-year-old son Walter disappeared (spoilers ahead). After several months without any progress, the L.A. police claimed to have recovered Walter in Illinois. The boy was brought to Los Angeles, but Ms. Collins soon recognized that he was not her son. Far from being a supernatural abduction, the changeling in question eventually admitted he had posed as Walter Collins in the hope of going to Hollywood to meet the movie star Tom Mix. Subsequent detective work suggested that the true Walter Collins was one of the victims of the Wineville Chicken Coop Murders (Bovsun 2012) although his mother never accepted that explanation.

The Nightmare by Henry Fuseli (1781). An incubus perched on a sleeping woman.

Common Themes of Changeling Stories

Folklorist Joyce Underwood Munro (1997) reviewed many of the traditional changeling stories and identified a number of common themes. The following is a brief summary of some:

- *Circumstances of the parents*: In most cases, changelings arrive in homes that are not entirely happy to begin with. They come to widows and widowers, single mothers, and others involved in some form of strife.
- *Baptism and naming*. Children who are unbaptized or unnamed are at greater risk. Changelings are often referred to as "it."
- *Leaving the child alone*. Stories often involve children being left alone, even for a short time. Constant vigilance is commonly recommended as a defense against babies being switched.
- *Parents recognize the change*. Like Christine Collins, typically parents see a change and claim the child is not theirs.
- *Physical changes.* The changeling is often described as ugly, deformed, shriveled up, and shaggy, but it always still bears a resemblance to the original child.
- *Behavior*. Changelings are said to be always crying, never satisfied with food, and wailing at night. But the children are also often described as very changeable in their behavior, displaying a sweet and compliant demeanor with others when their parents are not around.
- *Scapegoating the changeling.* Many of the stories suggest that the changeling has brought a general cloud over the household. Disappointments and misfortunes are blamed on the changeling.
- *Lack of growth or development.* Despite reports of eating large quantities of food, the child fails to grow. In some cases, not gaining size at all over the course of an entire year.
- *Consulting with a wise person.* Often the parents consult with someone with greater knowledge who advises them as to what to do next. As pointed out by Ashliman (1997), this provides a sense of shared responsibility for the actions taken by the parents.
- *Tricking the changeling*. In many of the stories, parents are advised to trick the changelings into revealing their true fairy or demon nature. Special foods are sometimes prepared to be given to the child, but often horribly abusive tests are recommended, such as throwing the child into a fire, burning with a hot poker, placing them on a red-hot griddle, withholding food, or

administering beatings. Mary Nell's red-hot shovel was not an anomaly.

- *Changeling betrays self*. Often during these tests, children are said to reveal themselves to be much older than their chronological age. On some occasions, this admission is made to another person, not the parents.
- *Banishment of the changeling*. Sometimes in the course of the test or as a separate act, the family rids itself of the imposter child. The child is said to have gone up the chimney or to have been reclaimed by the fairy mother.
- *Return or not of the original child*. In some cases, the only outcome of the test and banishment is the disappearance of the changeling. In other cases, the original child returns, either immediately or after some time. Finally, in some cases, the banishment fails, and the family makes a positive adjustment to the changeling.

Changeling Prevention and Treatment

Because the fear of stolen children was so rampant, many precautions were proposed for warding off demons and trolls and preventing the theft of a child. In his 1835 book *Deutsche Mythologie*, Jacob Grimm recommended that babies be constantly watched over: "Women who have recently been delivered may not go to sleep until someone is watching over the child. Mothers who are overcome by sleep often have changelings laid in their cradles" (cited in Ashliman 1997). A number of religious protective measures were employed. Catholics tended to use holy water, crucifixes, and representations of saints, whereas Protestants would often place the Bible or pages of the Bible in the child's crib. In both sects, an unbaptized child was considered at risk (Ashliman 1997).

Once a child was identified as a changeling, the diagnosis often served as a justification for the kinds of horrible treatment described by Munro (1997) above. One of the more famous Grimm brothers' stories includes many of the elements described by Munro (1997), including the method of banishment. For example, in 1580 a mother who was employed in a nobleman's field during harvest time placed her week-old infant in a patch of grass while she worked. When she returned to nurse her baby, it drank milk like no child she had ever seen before, and she was convinced the infant was not hers. At the suggestion of the nobleman, she beat the child with a switch until it cried out, at which point the devil appeared and returned her original child (*German Legends* [1816], no. 88, cited by Ashliman 1997). This kind of treatment did not only occur in books. Eighteenth century European court records show that many parents who were charged with abandonment, manslaughter, and neglect claimed their children were changelings left by demons, fairies, or the devil (Froud 2017).

It is likely that before the nineteenth century, many conditions that we now know to be medical—rather than supernatural—could have prompted parents to think their children were changelings.

Medical Explanations for Changelings

It is likely that before the nineteenth century, many conditions that we now know to be medical—rather than supernatural—could have prompted parents to think their children were changelings. As mentioned above, the typical stories point to a condition we know as failure to thrive. This phrase describes a general outcome—not gaining weight or developing normally—that can result from a variety of underlying disorders, including cow's milk intolerance, celiac disease, and inflammatory bowel disease (Marcovitch 1994; Schwartz 2000). However, the changeling legend was most widely believed in pre-scientific times when witches, the devil, and fairies were thought to be active participants in everyday life, and medical science had not yet offered an alternative explanation for these conditions.

In addition to failure to thrive, before the development of modern medicine and psychiatry, it is very likely that any number of childhood disorders were interpreted as stolen children. Several modern authors have suggested that in pre-scientific eras children born with autism and other developmental disorders were probably considered changelings (Ashliman 1997; Wing and Potter 2002). By the late nineteenth century, science had begun to provide nonsupernatural explanations for children who did not thrive or otherwise did not meet the normal expectations for a healthy infant, and belief in changelings faded.

Facilitated Communication: A child not looking at the keyboard while her facilitator guides her hand over the keys.

Today's Changelings

Although fairies, incubi, witches, and demons play a much smaller role in our world today, we are far from free of the changeling impulse. If anything, our expectations about childbirth and parenthood are greater than those of couples in the middle ages.[2] When children don't meet these expectations, parents sometimes find a different demon to blame. The anti-vaccination movement attributes autism to a greedy pharmaceutical industry supported by a government conspiracy. Most cases of autism involve developmental delays that begin within the first year of life, but a small percentage of autistic children show a regressive form of the disorder marked by normal development in the first years followed by a decline. Parents report that their children have changed and can no longer perform as they once did, in some cases losing language skills they previously had (Pickles et al. 2009; Taylor et al. 2002).

Some of these parents have attributed this regression to the toxic effects of vaccines, but research does not support this conclusion. For example, Taylor et al. (2002) found no change in the rate of regressive autism after the introduction of the measles, mumps, and rubella (MMR) vaccine in the United States.

In other contemporary cases, parents of developmentally disabled children reject the diagnosis of autism and claim their children have a physical—rather than a developmental—disability. They are delighted to find out that with the help of facilitated communication (FC) or a variant of FC, such as rapid prompting method, their children's normal functioning level is revealed in messages typed on keyboards or tapped out on letter boards. The children's hands may require guiding by verbally competent facilitators to get the sentences typed out, but the result is remarkably fluent language. A devastating condition is avoided. Unfortunately, the overwhelming evidence of research on facilitated communication shows that the language-competent adult facilitators are unconsciously typing out the messages and the children are not communicating at all. It is a Ouija-like phenomenon.

Modern Methods of Banishment

Although autistic children are rarely called changelings today, they are sometimes subject to banishments that are, in their own way, almost as cruel as those administered in the Middle Ages. The parents of nonverbal children who embrace facilitated communication unwittingly turn their children into marionettes. Furthermore, because these children often use facilitated communication at school—and even in college—they are denied years of evidence-based education that could help them become truly independent.

In the case of parents who think their children are the victims of vaccines, some have subjected their kids to chelation therapy, an invasive medical procedure used to remove the heavy metals these parents presume to be the cause of their child's autism. Of course, there is no research support for chelation therapy's effectiveness as an autism treatment. Worse, there have been a number of reports of deaths of young children with autism who have been subjected to this treatment, both in the United States and Britain (Centers for Disease Control and Prevention 2006; Woznicki 2005). The chelation-related death of an autistic child in the U.K. prompted the editors of the *British Medical Journal* to publish an editorial warning against the use of this treatment: "Serious concern should arise about the ongoing use of chelation therapy in children with autism at this time, especially when the side effects of appropriate administration are well reported, a death has occurred with an error of administration, and the treatment incurs a cost for the families" (Sinha et al. 2006).

* * *

For so many of us, the dream of a healthy baby to love and hold is central to the story of our lives. Children give us meaning and purpose, and if all goes well, these little people offer us the prospect of a kind of immortality. Unfortunately, sometimes the child we get is not exactly as we imagined, and there are challenges we never thought we would have to face. Today, genetic counseling makes it possible to avoid many unwanted childhood conditions, and when a baby arrives that is not exactly what the parents hoped for, science provides a natural explanation—if not always a cure—for what has befallen the family. It is understandable why many parents might have the urge to deny the truth and declare their child a kind of changeling. But the challenge of parenthood is to recognize our children for who they are and do what is necessary to give them the best life they can possibly have. ■

Notes

1. "A Remarkable Case of Hallucination. Mother Burns Child to Death." *The New York Times*, March 18, 1863, 8. Available online at http://www.nytimes.com/1863/03/18/archives/local-intelligence-the-atlantic-telegraph-and-its-prospects.html.

2. Interestingly, a number of the original texts cited overly doting parents as one of the precipitants of a changeling child (e.g., Kramer and Sprenger [1484] 1928).

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Benjamin Radford is a research fellow at the Committee for Skeptical Inquiry and author or coauthor of ten books, including *Investigating Ghosts: The Scientific Search for Spirits*.

The Phantom Menace of UFO Revelation

Q: I heard you on an episode of the *StarTalk Radio Show*, and host Seth Shostak asked why governments around the world would hide evidence of extraterrestrial life. You mentioned that the reason conspiracy theorists often give—to avoid mass panic—was absurd because polls show that many people (about a third) already think aliens exist. But if the government admitted extraterrestrial contact, that still leaves two-thirds of the people who *would* panic. Isn't that a significant number?

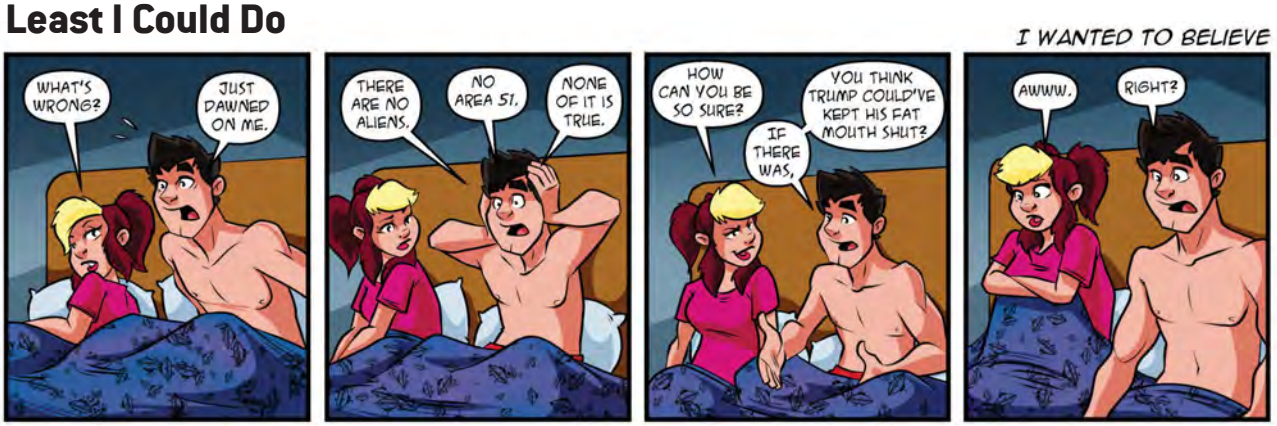
—Jorge C.

A: The above query echoes one I've often encountered when dealing with people who are convinced that governments around the world are engaged in an astonishingly effective and sustained effort to hide evidence of UFOs, alien bodies, crashed saucers, advanced technologies, and so on. Believers have spent decades marshalling a superficially impressive list of alleged coverups: Area 51; crashes at Roswell, Aztec, and other places; the alien base at Dulce, New Mexico; "disappearing" alien implants; Men in Black who have threatened, paid off, silenced, or killed thousands of eyewitnesses; and so on.

All in service of ... what, exactly? Why would the government go to such an extensive effort and expense trying to keep hundreds of thousands of people across the globe involved with NASA, the Air Force, the Pentagon, the FBI, and so on—along with all their current and former counterparts in dozens of other countries—from simply acknowledging what many people already assume to be true: that aliens exist?

The percentage of people who believe in extraterrestrial life varies by time, question phrasing, and poll; on *StarTalk*, I had referenced a 2005 Baylor Religion Study reporting that about a third of the public believes in UFOs (for an in-depth examination, see *Paranormal America* by Christopher Bader, Joseph Baker, and F. Carson Mencken). More recent polls suggest that the percentage has increased; for example, a 2017 poll from research and consulting firm Glocalities found that

Least I Could Do



By Ryan Sohmer and Lar deSouza (leasticoulddo.com)

"sixty-one percent of people believe that there is some form of life on other planets. Seventeen percent rule this out and only 22% say that they don't know. Forty-seven percent of people believe in the existence of intelligent alien civilizations in the universe. Twenty-six percent rule this out and 28% say that they don't know" (https://tinyurl.com/y9um7ymc).

If that's correct, then surely 61 percent of the public would not be "panicked" to find out that they're right about the existence of alien life. So that leaves 39 percent, as the numbers break down above, who don't already think alien life exists. (The UFO conspiracy doesn't suggest that the public would panic only if aliens were known to be present and active here on Earth—instead of merely existing somewhere "out there"—though a 2017 Chapman University survey found that 35 percent of those polled believe that extraterrestrials have indeed visited Earth.)

But just because a person doesn't believe that something is true doesn't necessarily mean that they would panic if they found out they were wrong. After all, people discover they're mistaken in their beliefs (on subjects both minor and major) all the time, and it doesn't send them into spirals of panic, hysteria, or existential despair. Of course revealing the "truth" about aliens need not involve introducing the Martian ambassador to the world or displaying the Roswell crash victims at the Smithsonian; it could simply be displaying messages received by SETI from other worlds.

Those who don't think alien life exists might in fact be delighted at an official acknowledgement that extraterrestrials have been contacted. Or they may be indifferent, or they might indeed panic. The response would not only vary by individual but also depend on many factors ranging from how closely the alien life resembles us to whether we are greeted with gifts or *War of the Worlds*–style glowing beams of destruction. For the sake of argument, let's say that the public's reactions are evenly divided among those responses. Of the 26 percent of people who "rule out" the existence of intelligent alien civilizations, that means that only 8.6 percent of the people would panic, while 91.4 percent of the world would not.

So the question remains: Why would the world's governments put so much effort into preventing a possible social disruption among a small minority of people? In 2017 and 2018, millions of people took to the streets protesting Trump administration policies, racial injustice, economic conditions, sexual harassment, and other issues in cities around the world. In some places, the military has been called out to keep the peace; how much more disruptive to public order and government stability would revealing the existence of aliens be? Governments can't even control small-scale panics within their own borders—rumors of nuclear war, for example, or Ebola outbreaks—so why would aliens be any different?

The percentage of people who believe in extraterrestrial life varies by time, question phrasing, and poll.

While governments surely would prefer not to have their citizens panic, preventing public panics does not seem to be a high priority for the government in America or anywhere else. The U.S. government couldn't even prevent an employee of the Hawaii Emergency Management Agency from sending out an emergency alert mistakenly warning of an incoming ballistic missile attack in January 2018—at a time of escalating tensions between the United States and North Korea. For nearly forty minutes, Hawaiians panicked and took shelter, before the public was notified that it had been a false alarm. Around the world there are far greater threats to public order than people panicking over a formal admission that aliens are real.

The UFO coverup conspiracy would have to span decades, cross international borders, and transcend political administrations. It's one thing to say that a given president, or even a country, might be able to successfully hide evidence of a crashed saucer, extraterrestrial technology, or bodies. But it's quite another to claim that all of the world's governments, in perpetuity, regardless of which political party is in power and even among enemies, have colluded to continue the coverup.

Robert Sheaffer, author of *Bad UFOs* and a former Skeptical Inquirer columnist, told me:

> It's an article of faith among many UFO proponents that the U.S. government knows that UFOs are alien craft and that they even have debris from crashed saucers, but they keep it all highly classified. Hence there is a big push for so-called "Disclosure," when the government will supposedly reveal all it knows about extraterrestrials. But if UFOs are prone to crash now and then, as they allegedly are, there is no reason to think that the U.S. is the only government in the world to be hiding alien secrets. Does Canada possess UFO secrets? Does the United Kingdom? France? Germany? Japan? Russia? China? The conspiracy would have us believe that all the major world governments, which can agree on nothing else, have all agreed to keep their secrets about extraterrestrials well-concealed.

The American intelligence community unanimously concluded that the Russian government has in recent years invested considerable time and effort in sowing fear and discord among Americans using social media. However, if this UFO conspiracy theory is true, the Kremlin's biggest weapon might merely be admitting that aliens exist. Israel and Iran want to blow each other off the face of the Earth but have secretly agreed to make sure people in other countries don't learn about UFOs? The irony, of course, is that even if the world's governments had proof of alien life and agreed to release it, the conspiracy theorists would just call it a "false flag" program of disinformation and demand to know what they're *not* being told. ■

WILDLIFE APOCALYPSE

How Myths and Superstitions Are Driving Animal Extinctions

Demand for wildlife body parts for scientifically unproven medicinal remedies and paranormal trinkets is causing a worldwide crisis for many endangered animal species, including rhinos and elephants.

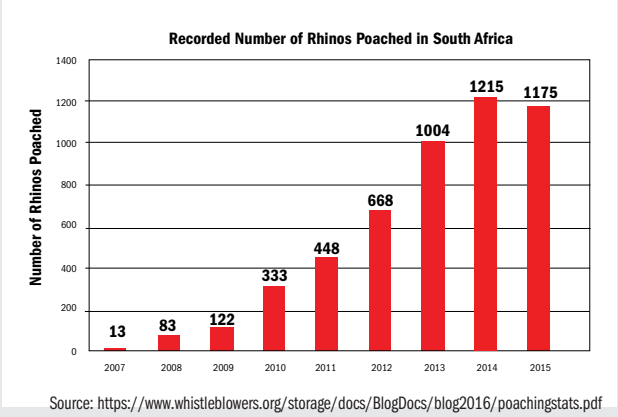
BOB LADENDORF AND BRETT LADENDORF

Sporting AK-47 assault rifles and axes, the group of men stalk a black rhino through the African bush. They soon bring it down with powerful volleys. While still alive, the rhino peers at the men as they approach. The poachers quickly use the axe to sever its horn from its head, not caring that they are inflicting great pain as they hit a nerve and leave the rhino dehorned and its head a pulpy mess. It dies, leaving its own family behind because of human greed.

"'Rhino have a particularly plaintive cry,' (conservationist Ian) Player[1] wrote (in *The White Rhino Saga*), 'which once heard is never forgotten. The screams of agony from rhino that have had their horns chopped off while still alive should reach into the hearts of all of us'" (Rademeyer 2017).

The poachers sell that horn to a middleman, who may be working for yet another smuggler, a criminal syndicate, or even terrorists. Government border agents and officials are bribed as the horn makes its way to countries such as China and Vietnam, where the horn is used in Traditional Chinese Medicine (TCM) to treat various ailments, none of them proven scientifically to work.[2]

While TCM does include a lot of vegetable- and herbal-based medicines, as well as non-endangered animal parts, the use of critically endangered animal parts that it promotes for scientifically unproven treatments and cures has been a major factor in the decline and extinction of animal species.



Source: https://www.whistleblowers.org/storage/docs/BlogDocs/blog2016/poachingstats.pdf

While most rhino horns are ground into powder and used as medicine to supposedly cure cancer, impotence, or, as an illegal wildlife trade monitor says, "you name it," people in Asia have begun wearing beads or bangles made from rhino horns thought to cure ailments as well as for status symbols. Some horns are fashioned into ceremonial cups (Kolata 2018).

Why is the illegal supply and demand for rhino horns so pervasive? Rhino horn, after all, is mainly composed of keratin, the same substance in human hair and fingernails. But it's as valuable as gold or heroin. A kilogram, for instance, can sell for $60,000 (Kolata 2018).

The killing of rhinos is just the tip of the iceberg in the ever-increasing destruction of wildlife for dubious reasons. Not only rhinos are facing extinction but also African elephants; certain species of lions, tigers, and wolves; Grauer's gorillas; and even giraffes. All this is done primarily at the hands of humans despite courageous efforts by conservation groups, governments, and individuals to stop the attacks. Some wildlife, such as rhinos and wolves, among many others, faced extinction when trade in animal parts was legal, but they now face that possibility again with illegal trading and other extinction pressures.

"Leading international wildlife crises involve illegal poaching of rhinos, elephants, and sharks for their body parts, to be sold on the Asian black market for exorbitant prices and used for medicinal purposes or art," stated Cristina Eisenberg, chief scientist at Earthwatch Institute in Boston and author of *The Carnivore Way: Coexisting with and Conserving North America's Predators*.

> The myth underlying this illegal bone trade runs very deep. Proponents tout rhino horn, shark fin (cartilage), and elephant tusk medicinal uses, as tonics, blood-purifiers, or aphrodisiacs. But ultimately, it's about money—these illegal products are primarily seen as status symbols in Asia. While the purported medicinal use of these items has not been proven by science, the profound negative consequence of poaching has been thoroughly documented and is decimating populations of rhinos, elephants, and sharks, leaving them at or near extinction. (Eisenberg 2018)

As of 2016, there were only 29,500 rhinos left in the world, 70 percent of them in South Africa. There are five species of rhinos—most of them endangered—with two subspecies going extinct in 2011 (Gwin 2012). Just a century ago, there were an estimated one million rhinos in Africa (Ellis 2005).

Some 30,000 elephants are poached yearly for their ivory (Showing That Every Elephant … 2017). *The Ivory Game* documentary warns that African elephants may become extinct in fifteen years. Biologists estimate that total loss of large mammals in Africa went up to 60 percent between 1970 and 2013 (Paterniti 2017). In the "Scientists' Warning to Humanity: Second Notice" last year, signed by more than 15,000 scientists in 184 countries, a highlight of the document was a 29 per-

cent reduction in the numbers of mammals, reptiles, amphibians, birds, and fish since the publication of the first notice in 1992 (Houtman 2017). The global black market in live animals and parts is the fourth largest in the world, with an estimated $20 billion in profits (Tackling Wildlife Trafficking 2017).

"Traders in ivory actually want extinction of elephants, and that is probably the biggest danger," warns Craig Millar, head of security for the Big Life Foundation/Kenya, in *The Ivory Game*. "The less elephants there are, the more the price rises. The more the price rises, the more people want to kill them. And this is an ever ongoing circle that is just going to end up bringing about exactly what they want—extinction." The same could be said about rhinos, lions, gorillas, and many other animal species.

Myths and Superstitions

While the trade in rhino horn is banned under the Convention on International Trade in Endangered Species of Fauna and Flora (CITES), the black market fueled by demand particularly from China and Vietnam is lucrative and primarily recent. In 2005, according to the organization Save the Rhino International, about sixty rhinos were killed for their horns or as trophies in Africa. Since then, more than 7,000 have been killed, with 1,346 in 2015 alone (Poaching in numbers 2017). In South Africa alone, poaching increased 9,000 percent from thirteen in 2007 to 1,215 in 2014 (Juskalian 2017; Save the Rhino International 2018).

Connecting a real animal with a mythical one is a task undertaken by marine biologist Richard Ellis, author of *Tiger Bone and Rhino Horn: The Destruction of Wildlife for Traditional Chinese Medicine*. He is a research associate at the American Museum of Natural History. "The use of rhino horn … can be traced to the unicorn, another animal with a horn growing from a totally unsuspected place" (Ellis 2005). He also wrote this for the European Association of Zoos and Aquaria's rhino campaign in 2005:

> It is not clear that rhino horn serves any medicinal purpose whatsoever, but it is a testimony to the power of tradition that millions of people believe that it does. Of course, if people want to believe in prayer, acupuncture, or voodoo as a cure for what ails them, there is no reason why they shouldn't, but if animals are being killed to provide nostrums that have been shown to be useless, then there is very good reason to curtail the use of rhino horn … . It is heartbreaking to realize that the world's rhinos are being eliminated from the face of the earth in the name of medications that probably don't work. (Save the Rhino International 2017)

While the scientifically unproven medicinal uses of rhino horn have driven the eastern Asian black market, there are additional extinction drivers, including the superstitious beliefs in the efficacy of rhino horn for hangover cures and as aphrodisiacs. While the media reports were actually wrong about Asians using rhino horn as a sexual stimulant, the attention paid to that error ironically sparked interest in using it for that equally scientifically unproven purpose! Elizabeth Kolbert pointed out in *The Sixth Extinction* that rhino horn in recent years is "even more sought-after as a high-end party 'drug'; at clubs in southeast Asia, powdered horn is snorted like cocaine" (Kolbert 2015).

Why is the illegal supply and demand for rhino horns so pervasive? Rhino horn, after all, is mainly composed of keratin, the same substance as in human hair and fingernails. But it's as valuable as gold or heroin.

An even more sensational claim is that rhino horn cures cancer, fueling even more demand. There's no scientific basis for that claim. The cause was likely a rumor started in Vietnam a decade ago that rhino horn had cured cancer in a near-death South Vietnamese Communist Party official. The rumor spread rapidly, and the price of rhino horn surged (Rademeyer 2017). This myth prompted poachers to increase their efforts at killing rhinos in Africa, some even using helicopters to track them down (Watts 2011).

Of course, there may be a placebo effect for some users of rhino horn. "Belief in a treatment, especially one that is wildly expensive and hard to get, can have a powerful effect on how a patient feels," stated Mary Hardy, medical director of Simms/Mann UCLA Center for Integrative Oncology and "a traditional medicine expert," according to *National Geographic* magazine (Gwin 2012).

While TCM does include a lot of vegetable- and herbal-based medicines, as well as non-endangered animal parts, the use of critically endangered animal parts that it promotes for scientifically unproven treatments and cures has been a major factor in the decline

and extinction of animal species. Numerous articles in science publications, including this magazine, confirm that these purported remedies have no basis in fact. The late Robert Carroll wrote in his *Skeptic's Dictionary* that "Magical thinking is clearly the basis for some of these concoctions, e.g. deer penis to enhance male virility. Many of the medicinals lead to the suffering and unnecessary maiming and killing of many animals." As examples, Carroll relates how thousands of bears are kept in cages throughout Asia so their bile can be tapped and sold to cure various ailments. "Other animals are treated with equal disdain: sharks for their fins, rhinos for their horns, and tigers and tortoises for various body parts" (Carroll 2018).

As TCM continues the pressure on the illegal use of rhino horn, other connected factors help to reduce the numbers of these animals, as well as other wildlife. Some 73–100 million sharks are killed yearly, primarily for their fins for shark fin soup in Vietnam and China (Masson 2014; Defenders of Wildlife 2018) There's no scientific evidence that the soup treats any medical condition, including cancer. It's primarily a luxury item in Chinese culture, although consumption of the soup has been reduced in recent years with the introduction of an imitation shark fin soup (Shark fin soup 2018).

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The vaquita, the smallest marine mammal that lives exclusively in the upper Gulf of California in Mexico, is almost extinct because they get caught in gillnets used to catch Mexican shrimp. Because of a high demand in China for its dried swim bladders "for their supposed medicinal properties," the endangered totoaba fish is caught in the illegal gillnetting in the Gulf. A campaign urging consumers to boycott Mexican shrimp and asking the Mexican government to ban all gillnetting to save the vaquitas and totoaba has not been successful. "The Mexican government is putting shrimp industry profits over saving this tiny porpoise from its freefall into extinction," says Alejandra Goyenechea, senior international counsel for the Defenders of Wildlife organization (Boycott Mexican Shrimp to Save Vaquitas! 2017). In 2018, the Elephant Action League's Sea Shepherd ship continued its battle with fishermen and the illegal nets; one of their anti-poaching camera drones was shot down there in late December 2017 (Tillman 2017).

Another mammal under assault for its dubious medicinal qualities is the pangolin, who rolls up in a ball for defense with scales on the outside. While not currently endangered, the pangolin may be the most illegally trafficked animal in the world, with some estimates as high as 2.7 million yearly. The pangolin scales are sold for as much as $750 a kilogram. "Most … end up in China and Vietnam," reports *The Economist*. "In these countries pangolins' meat is a treat and their scales are used in folk medicine, even though the scales are made of keratin … and thus have no medicinal value" (A problem of scale 2018).

Some providers and consumers of sharks and other endangered species in East Asian countries may argue that the animals are killed for calories and protein, in addition to dubious medicinal practices, and continue to be needed to help feed growing populations. As far as they are concerned, animal species may be low-hanging fruit, whether endangered or not. They also may

question whether those in the West who are critical of their eating habits should deal with their own issues of overfishing in the Gulf of Mexico, the waters of the Pacific Northwest, and Chesapeake Bay. Then there is the religious argument that humans have "dominion" over the animals, as mentioned in Genesis 1.

The Price of Poaching

With retail prices per kilo in the tens of thousands of dollars, the $20 billion black market hosts brazen players trying to make a buck. The mastermind sellers in animal parts, with methods for extraction, distribution, and financing, are likely to operate their networks similar to that of international drug cartels or arms dealers. Along the supply chain exist financial incentives for

personnel with wealth accumulating to those who can control most of the network. From poachers to wholesalers to dealers to art merchants to buyers at the retail level, the profit margins drive incentives. Enforcers of the parts trade accumulate wealth but so do those at the retail end who can distribute to mass markets, whether in the form of "medicine" or in the form of "art." For example, poachers will receive as little as $7 per kilo of ivory for an African elephant tusk. In the documentary *The Ivory Game*, an arrested Tanzanian poacher received from a dealer such a sum—a couple hundred dollars—for two tusks weighing fifteen kilos each. The dealer then parlayed his purchase into $3,000 per kilo in China.

On the streets across the world, there's significant variance in the economic value of the tusks, or rhino horns, driving the incentive for wholesalers to move more product. In one instance, the ivory tusks were found in a Chinese retail shop that was selling a painted tusk for $330,000, or $22,000 per kilo. If that same tusk had been extracted by the Tanzanian poacher, that would be more than 3,000 times the price paid at the source.

With the recent banning of the ivory trade in China, prices for the legal selling of tusks dropped, but it's too early to determine that impact on the black market. However, documented evidence of the illegal trade, such as that highlighted in *The Ivory Game*, is shining a light on the amounts involved along the supply chain. As a tusk, or a rhino horn, travels from the animal carcass on the plains of sub-Saharan Africa to the medicine cabinet of an East Asian retiree, the price increase has been phenomenal in recent years.

Other Animal Extinction Pressures

According to a 2013 survey by TRAFFIC, an organization that monitors illegal wildlife trade for the World Wildlife Fund and the International Union for Conservation of Nature (IUCN)—known for its Red List of Endangered Species—rhino horn also is a status symbol for the rich in countries such as China and Vietnam. "The motivation for consumers buying rhino horn (are) the emotional benefits rather than medicinal, as it reaffirms their social status among their peers. Image and status (are) important to these consumers," and "they tend to be highly educated and successful people who have a powerful social network and no affinity to wildlife. Rhino horns are sometimes bought for the sole purpose of being gifted to others; to family members, business colleagues or people in positions of authority" (Save the Rhino International 2017).

Even war is bad for wildlife, as shown by researchers Rob Pringle and Joshua Daskin in their recent *Nature* article. They conclude that wars do wildlife more harm than good, exposing animals to bombs and landmines and increasing the demand for ivory and bushmeat that are used to finance and feed armies (Conflict's other casualties 2018; Kaplan 2018).

The emotional impact on chimpanzees and gorillas was well illustrated in the documentary *Virunga*, which showed the heroic struggles of Virunga National Park caretakers and military rangers to protect the animals from the intrusions of armies as well as poachers. Seeing the fear in the animal faces as they clung to the caretakers as bombs exploded nearby shows the difficulties faced by both wildlife and humans.

An additional pressure on wildlife and their ecosystems is the proposed completion of the U.S.-Mexico border wall by President Trump. According to studies, some 700 vertebrate species, such as jaguars, Mexican gray wolves, ocelots, mountain lions, and black bears, rely on the borderland habitat—and more than 180 of the borderland species are already listed as endangered or threatened. A wall also would keep those animals from natural crossings—wildlife corridors (State of the border 2018). While U.S. laws could help protect endangered species, Congress passed a law in 2005 giving the Department of Homeland Security authority to waive all laws when constructing a wall. The agency already has used its authority to waive forty laws, such as

Alarming Biodiversity Loss Predicted in New Scientific Reports

As shown in the main article, many wildlife species are experiencing severe declines in numbers due to the demand for animal parts based on myths and superstitions. Four new landmark scientific summary reports released by an intergovernmental body March 23 show that Earth's biodiversity is declining alarmingly worldwide.

The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) states in one of its regional reports on Africa that all flora and fauna are threatened by human-induced and natural causes. By 2100, climate change alone could reduce by half Africa's bird and mammal species, along with a significant loss of plant species. In the next thirty years, Africa's population is expected to double to 2.5 billion people.

These added pressures, coupled with the ongoing rapid loss of mammal species in Africa and elsewhere, will only increase the chances of a wildlife apocalypse, although the reports do describe measures to ameliorate biodiversity losses and give hope for halting the decline of animal and plant species.

Full reports with data will be released later this year. For more information about the summary reports for policymakers and IPBES, go to www.ipbes.net.

the Clean Air Act and the Endangered Species Act, in constructing 650 miles of barrier in past years. (Schlyer 2018).[3] There have been border protests against the new wall and pending lawsuits by environmental and animal rights organizations (Against the Wall 2017).

One area of dispute as to whether it contributes to the decline in large animals is trophy hunting. Hunters who paid a lot of money for permits to shoot and import elephant and other wildlife trophies argue that the money helps in the conservation of animals in Africa, while animal rights groups say the trophy hunting "causes immense suffering and fuels the demand for wild animal products" (Pearce 2017b). For a big game hunt, for instance, a hunter might pay up to $200,000 for a rifle and $80,000 for a fourteen-day single elephant hunt (Paterniti 2017). A portion of the fee is paid to community members, such as the San in Namibia, and a portion for a conservation fund. An African trophy hunt for a leopard may bring in as much as $55,000, while a lion fetches up to $76,000. While some people still hunt to eat, sport hunters are in it for the thrill and to show off their "trophies," although some face severe criticism as did the American who killed the well-known Cecil the Lion (Paterniti 2017).

President Trump planned to partially reverse an Obama-era ban last November by allowing hunters to import trophies from Zambia and Zimbabwe, then he reversed himself and postponed the decision after an outcry from citizens and lawmakers. California Rep. Ed Royce, a Republican Congressman, pointed out that the political turmoil in Zimbabwe could spell doom for wildlife. "Elephants and other big game in Africa are blood currency for terrorist organizations, and they are being killed at an alarming rate," he said (Pearce 2017a). In that country, points out Vanda Felbab-Brown, a senior fellow at the Brookings Institution and author of *The Extinction Market*, authorities seize the hunting preserves and keep the profits; they don't reinvest in conservation. She said the trophy hunting business "becomes very commercialized and the profits are captured by elites. You can also end up with trophy hunting serving as a cover for trafficking" (Nuwer 2017).

Climate change provides additional pressures on wildlife, such as polar bears coping with the shrinking of Arctic ice. There are many other effects. "As the seasonal cycles in temperature and rainfall shift," writes climate scientist Prof. Michael E. Mann, "altering by different amounts the timing of the hatching of insects and the arrival of birds, entire food webs are in danger of disruption. Plants and animals possess a certain amount of behavioral elasticity, but the more rapid the changes, the more likely this intrinsic adaptive capacity will be exceeded, and the more likely that we humans will be responsible for one of the most devastating extinction events in Earth's history" (Mann and Toles 2016).

These additional pressures—added to the demand for certain wildlife, such as rhinos and elephants, based on myths and superstitions—may indeed produce a wildlife apocalypse.

Live Wild Pet Trade

While China and Vietnam have been the main drivers for the extinction of rhinos and elephants, the United States and Europe have surprisingly major black markets for the trade in wild, exotic pets. Birds and snakes from overseas are stuffed into soda bottles for transit to the Western countries. Tragically, 90 percent of these animals die in transit (Wild Matters 2017). Many of the same black marketers in wild animal parts, such as rhino horn, also spark the trade in live animals (Conniff 2017).

"Many of these people who were doing the traditional medicine trade are now branching out because the high-end pet trade in China has grown immensely," commented Brian Horne, a herpetologist for the Wildlife Conservation Society. Critically endangered adult ploughshare tortoises that live only in Madagascar cost $100,000 each, which now draws in criminal elements. For example, thieves broke into a captive breeding facility in Thailand—set up by conservationists to rebuild populations of endangered species—and stole six

ploughshare tortoises. The trade in exotic pets, according to conservation biologist David S. Wilcove, has "the potential to drive species to extinction even when they have suitable habitat, and to do so without anyone being aware of it" (Conniff 2017).

How Smartphones Decimated Grauer's Gorillas

Just when anyone interested in preserving species on the verge of extinction feels comfortable that many efforts are being made to fight back through the work of governments, nongovernmental organizations (NGOs), and concerned individuals, the disquieting news is the human demand for cell phones is the cause of at least one mammal's near extinction. Grauer's gorillas in the Congo have suffered a 77 percent decline in the past two decades because of the consumer electronics explosion. How?

One of the key components of a cell phone is the mineral coltan, and 80 percent of it is found in mines in the Congo. Those mines that destroy the land to unearth coltan and other minerals often use young children. These are "artisanal" operations, meaning that the mining requires not machinery but laborers digging craters into stream beds by hand. Amnesty International reports that as many as 40,000 children may be mining for coltan in the Congo.

"To feed these people, wildlife is hunted from the surrounding forests," said Tara Stoinski, president and chief scientist of the Dian Fossey Gorilla Fund International. "This includes gorillas, chimpanzees, elephants, and many other species." Trade in bushmeat is illegal, but the Congo is a war-torn region that makes such laws unenforceable (Posada 2017).

Fighting Back

While the outlook is dire for many species, including giraffes in Africa that have seen their numbers decline nearly 40 percent from 1985–2015 to less than 100,000 now, the good news is that many governments, NGOs, conservation organizations, and individuals are banding together to save as many species as possible. As of January 1, 2018, China has banned all trade in ivory, which follows the lead of the United States in 2016 (Giraffes newly classified 2017). Hong Kong also announced in late January that it would ban all ivory trade by 2021. Just this past July, 7.2 tons of new elephant tusks were found under frozen fish in Hong Kong and confiscated. Only ivory acquired before 1970 is legal there (May 2018).

In 2017, Operation Thunderbird, a sixty-nation global seizure of illegal wildlife and floral trade, identified 900 suspects, with 1,300 seizures worth $5.1 million (Wild Matters: Tackling Wildlife Trafficking 2017). More than 1,000 rangers have given up their lives from 2004–2014, primarily in Africa, protecting wildlife from poachers (Chancellor 2014).[4] A conservation organization, The Nature Conservancy, partnered with the Northern Rangelands Trust to reduce poaching in Northern Kenya (Oluchina 2014). However, the fight against poachers in Africa received a setback when famous American conservation investigator Esmond Bradley Martin, seventy-five, was stabbed to death at his home in a possible murder that may have been disguised as a robbery of the long-time activist who uncovered illegal global trafficking of ivory and rhino horn (Dixon 2018).

In January 2018, Ivory Coast officials said they broke up an international ivory-smuggling network, the second such bust on the continent that month. They arrested six people and confiscated more than half a ton each of ivory and pangolin scales, as well as leopard parts. The network hid ivory parts in hollowed-out logs that were resealed and shipped to Asian countries. The suspects had made calls to tax-haven countries, leading

Selected Organizations Fighting for Animals

Below is a list of organizations that are active in protecting animals, including those involved in dangerous anti-poaching efforts, filing lawsuits for animal rights, and conducting scientific research to determine the threats faced by animals. The alphabetical list, which is by no means comprehensive, provides contact information in case you want to help with efforts to prevent the extinction of animals.

- Center for Biological Diversity — www.biologicaldiversity.org
- Defenders of Wildlife — www.defenders.org
- Earthjustice — www.earthjustice.org/the-wild/wildlife
- Earthwatch — www.earthwatch.org
- Elephant Action League — www.elephantleague.org
- Greenpeace — www.greenpeace.org/usa
- Marine Mammal Center — www.marinemammalcenter.org
- National Audubon Society — www.audubon.org
- National Geographic Society — www.nationalgeographic.org
- National Wildlife Federation — www.nwf.org
- Natural Resources Defense Council — www.nrdc.org
- Ocean Conservancy — www.oceanconservancy.org
- Oceana — www.oceana.org
- Save the Rhino International — www.savetherhino.org
- Sierra Club — www.sierraclub.org
- The Jane Goodall Institute — www.janegoodall.org
- Wildleaks — www.wildleaks.org
- World Wildlife Fund — www.worldwildlife.org

officials to suspect money laundering. In another bust in Gabon, officials said they also broke up a smuggling network that had ties to a cell of Boko Haram, the Islamic militant group responsible for numerous murders and kidnappings in northern Nigeria and bordering countries (Searcey 2018).

Undercover NGO investigators and journalists have been instrumental in identifying companies, merchants, and corrupt businessmen involved in the illegal wildlife trafficking trade, as shown in the documentaries *The Ivory Game* and *Virunga*. There are many organizations working to save wildlife, from long-standing ones such as The Sierra Club and Defenders of Wildlife to newer ones such as the Elephant Action League, Wildleaks, and United for Wildlife, which was created by the Duke (Prince William) and Duchess (Catherine) of Cambridge and Prince Harry. Others, such as Earthwatch, engage citizen scientists in worldwide expeditions to provide data for scientific studies on wildlife, climate change, and other matters.

There's even a new tactic in wildlife conservation: horn and tusk forensics. Like the genetic fingerprinting methods in the criminal justice system, scientists are making efforts to match the DNA of a rhino or elephant with its horn or tusk in possession of a poacher. A scientific database called Rhodis (modeled after the FBI's Codis system) has been established with some 20,000 samples taken from rhinos by Dr. Cindy Harper, a veterinarian at the University of Pretoria, and her colleagues (Kolata 2018).

These efforts may be too little, too late for some species, but they give hope to others. Not only is there some success in reducing poaching, but there is also increasing awareness in the public about the wildlife trafficking issues. The false beliefs that have driven poaching and decimation of various species need to be corrected, and the "profits captured by elites," as termed by Felbab-Brown, need to be stopped (Nuwer 2017). Even John Hume, the controversial rhino rancher behind the rhino-ranching movement to legalize the rhino horn trade in South Africa and the subject of the controversial documentary *Trophy*, thinks rhino horn medicinal uses are bunk. It doesn't matter to him that rhino horn is snake oil when it comes to treating serious maladies. "I'm not ashamed that the rhino horn I make available to the world could possibly be ingested by somebody who's got cancer and he dies anyway. It's not going to help them" (Christy 2016).

It's hard not to feel sad for the brutality inflicted on animals for purposes of human beliefs in myths and superstitions, for status and appetites, and for plain old greed. A lasting image of the horrible legacy of inhumane treatments of animals can be seen in The Reliquary, a U.S. government warehouse outside Denver that holds 1.3 million products made from animals, many of them threatened or endangered species. Many were donated, but most were seized upon entry. Just 10 percent of global trade in banned wildlife is intercepted. In the repository, you'll see an African elephant footstool, tiger teeth and claws fashioned into jewelry, a hat made of black bear skin, Tibetan antelope shawls, and a rhinoceros snout and horns on a wooden platter (Spinski 2017).

The fight continues to save endangered animals, and we can only hope that all humans realize the necessity for animal biodiversity and the need for scientific evidence in the use of medicines. "Too many animals, from sea horses to rhinoceroses, are endangered by the demands of traditional Chinese medicine," says author Richard Ellis.[5] "Of course, TCM is not the only factor in the endangerment of these animals, but it plays an enormous part. If present trends continue, tigers and rhinos will become extinct in the wild, perhaps in our lifetime and almost certainly in the lifetime of our children's children" (Ellis 2005).

From the savannahs of Africa to the ports of North America, the black market trade in animal parts is lucrative for top smugglers. Demand is driven for many reasons, of which belief in false medicines can perhaps have the best chance of being reduced through educational outreach and policies guided by progressive studies of human behavior. Government programs and public-private agency partnerships can and have demonstrated success in nudging consumer behavior in a direction that can produce positive outcomes for the self and the community. It can start with something as little as a contest for an anti-littering slogan along Texan highways to change human behavior. It can be a program to frame better choices for consumers who desire certain attributes from parts of animals. Though affecting the behavior of those who demand parts for status or for value may prove the hardest work, moving humans toward awareness through education and science may have the most profound effect on a mass scale.

For Carl Sagan, it would be "far better to grasp the Universe as it really is than to persist in delusion, however satisfying and reassuring" (Sagan 1997). Though Sagan focused on the possibility of life beyond Earth, he knew that the greatest dangers to our own well-being and to that of our environment came from within ourselves. For our planet, the reduction and loss of species from these delusions of grandeur is tragic. It also would be a tragedy if we weren't able to fight off the AK-47s and machetes with better knowledge on why people reject science in favor of the dark. ■

Notes

1. Ian Player is credited with saving South Africa's rhinos from extinction in the 1960s.

2. A 2015 article in Skeptical Inquirer by Harriet Hall, for instance, casts doubt on TCM versus science-based medicine: "Traditional Chinese Medicine (TCM) Didn't Win a Nobel Prize, Scientific Medicine Did." It is available online at https://www.csicop.org/specialarticles/show/traditional_chinese_medicine_tcm_didnr-squot_win_a_nobel_prize_scientific_me.

3. The value and extent of wildlife corridors in North America is explained by Cristina Eisenberg in her book *The Carnivore Way: Coexisting with and Conserving North America's Predators*.

4. For a more detailed account of how rangers face dangers from poachers, see Robyn Dixon's "Elephant Men," *Los Angeles Times*, December 22, 2017. Another article on the rhino horn legal trade controversy is Robyn Dixon's "It's Cruelty beyond Words," *Los Angeles Times*, August 2, 2017.

5. In Ellis's *Tiger Bone & Rhino Horn: The Destruction of Wildlife for Traditional Chinese Medicine*, chapter 3 ("Chinese Medicine, Western Medicine") discusses TCM in detail, while chapter 4 ("Horn of Plenty") details the history of the "unicorn" and its connection to the supernatural and the reality of real animal horns.

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Skepticism Reloaded

A leading skeptic addresses the essence of contemporary skepticism and highlights the vital nonpartisan and science-based role of skeptics in preventing deception and harm.

AMARDEO SARMA

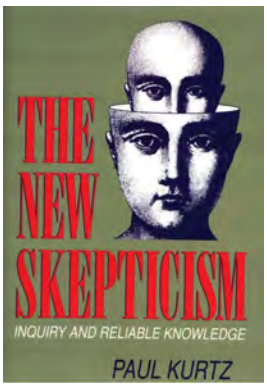
Forty-two years have passed since the birth of CSICOP, the Committee for the Scientific Investigation of Claims of the Paranormal (now the Committee for Skeptical Inquiry, CSI), and its magazine, Skeptical Inquirer. Soon after its birth, there was a wave of skepticism across the globe. A great visionary was at the center of the explosion: Paul Kurtz, a philosophy professor who saw skepticism as a global worldwide endeavor. The Australian Skeptics took off in 1980 with Mark Plummer as president. A decade later, in the mid-1980s, CSICOP encouraged skeptics all over the world to form their own groups.

Mark Plummer, then executive director of CSICOP, and Wendy Grossman, founder of the magazine *The Skeptic* in the United Kingdom, toured Europe in this mission, resulting in many new groups.

Paul Kurtz also defined skepticism as he saw fit for the movement in his book *The New Skepticism* (1992). This variant is what we would now call "scientific skepticism." It is distinct from the ancient Greek variety of *skepticism* that denied that we could acquire knowledge and wanted us not to take a stand—to suspend judgment.

Skeptics today do take a stand. They insist on skeptical inquiry, which is at the core of scientific research, as a fundamental and indispensable tool. At the same time, they also acknowledge that the body of science represents reliable knowledge of a real world. More importantly, they stand up and advocate for what we know about science and pseudoscience, even when others (including friends and colleagues) frown on us. Skeptics today are committed to scientific realism.

Initially, the movement focused mainly on fringe science claims ignored by the scientific establishment. A decade ago, Kendrick Frazier, editor of Skeptical Inquirer, extended the scope. In the book *Science under Siege: Defending Science, Exposing Pseudoscience* (2009), he put the defense of science itself on the map. Publications and events organized by skeptics had been increasingly taking up anthropogenic global warming, GMOs, and the anti-vaccination movement. Conspiracy theories are a recent addition. (See also Frazier's Commentary "In Troubled Times, This is What We Do," Skeptical Inquirer, March/April 2018.)



With the twenty-first–century trend of "alternative facts" well underway, the time is ripe for revitalizing a vision for the future.

We need to begin by framing our cause and our identity as skeptics worldwide. Let us start from the very core.

Why Do We Do What We Do?

Why do we bother? What drives us? Do we enjoy showing that others are wrong? Or do we want to show that we are

somehow better than others who we believe to be ignorant?

The answer is central to the skeptical movement. It defines the ambition of contemporary skepticism.

Our overall goal and vision must be at the very core of our motivation, at what drives us. Let us take an example from someone who set out to change the world, Rev. Dr. Martin Luther King Jr. He had a dream. What is ours?

We strive for a world in which pseudoscientific claims do not deceive or harm anyone.

Our motivation also defines what we are concerned with: unfounded, unscientific, pseudoscientific, antiscientific, or plainly false claims. With our tools of skeptical inquiry and with the background of reliable, scientific knowledge, we do not want such false claims to fool or deceive us or others and thus harm us or withhold benefits from us. By doing so, we also want to better understand the world around us and the mechanisms by which our wishful thinking leads us astray.

So how do we reach our goals or strive to fulfil our dream? How do we limit deception and harm caused by pseudoscientific claims? Most skeptical organizations focus on science and critical thinking as the best available instruments of reliable knowledge by far. Most would describe their mission and how they achieve their overall goals in some version of the following:

We provide reliable information on claims that contradict science and the tools of skeptical inquiry to evaluate and investigate them.

Our vision and mission together define the driving values of skeptical organizations. They are the reason so many skeptics are passionate about what they do and spend so much of their time and money for skepticism instead of for themselves and their own benefit. We need these values to motivate us and others to action.

What Makes Us Different?

Skeptics are neither the first nor the only people educating the public about science or on what might be disadvantageous for them. We have consumer protection agencies, testing agencies and companies, science communicators, the scientific establishment itself, and information portals, such as ones on climate change.

It does not make sense to duplicate others' efforts. There is, however, something particular and unique to what we have been doing and will very likely continue doing in the future. I see three elements that define our scope and approach:

1. We take on issues on which others for various reasons are silent. Initially, these were limited to fringe science issues, but this has changed significantly of late.
2. We focus on delusion, self-delusion, and wishful thinking that may lead us astray. It is no coincidence that magicians were part of the movement from the very start.
3. We are truly nonpartisan and independent and know that every political, ideological, and religious inclination can lead to self-delusion in some areas. Even skeptics may fall for claims that they wish to be true if they do not remind themselves that they too have their political, ideological, and religious or nonreligious biases that could cloud their objectivity.

The reason we have taken up such issues is that others are reluctant to deal with them for fear of antagonizing people they need to work with or on whom their career paths may depend.

Our work is much harder than it would be in an ideal world because many of those who should know better are failing. Universities have allowed pseudoscience in their curricula. Too many leading scientists and renowned experts are silent when they should be speaking up. We often need to do the dirty work of others, as in keeping quackery out of medicine. Several NGOs have gone off course and have ignored science and evidence.

Alternative facts and fake news are not new. And even the use of these terms is losing its meaning when those who spread bullshit apply those terms to those who are more factual than they are.

As skeptics, we have a growing job to do, and this means much more work for us all.

Skeptics today do take a stand. They insist on skeptical inquiry, which is at the core of scientific research, as a fundamental and indispensable tool.

Scientific Skepticism Is Central to Our Well-Being

Contemporary skepticism is about everybody, not just us as skeptics. It is about everyone's well-being, now and in the future. Its approach combines science and critical thinking—twins of a sort.

As skeptics, we place our confidence in science as by far the best means to acquire knowledge that we can rely on, even on matters of life and death. We are also aware that we as humans have a broad capability to fool ourselves. This psychological limitation can severely damage us individually or the planet as a whole, and it can also prevent us from taking useful action.

The potential consequences also point to how we would want to prioritize our efforts. As a disclaimer, any prioritization should not discourage anyone from pursuing their favorite project or topic. Our success depends on enthusiasm, and we do not know whether a "pet" topic of today could become a significant problem years or decades in the future. People are best at doing what they love doing.

Many skeptical organizations are already prioritizing their work based on how much harm some areas cause or how much benefit they prevent. Examples are:

- Pseudomedicine in all its forms, such as homeopathy;
- Denying the usefulness of vaccination or even the fact that viruses cause diseases; and
- The spread of superstition and magical thinking with significant damaging potential. (Rationalists in India and skeptics in Africa face physical threats and endanger their lives with their engagement.)

In line with a view on possible consequences and possible harm or denied improvement, global warming and GMOs have been rightly taken up.

Both prioritized and "pet" topics have led to a wealth of information worldwide that skeptics make available today. We can all draw from these resources and have done so in the past. The German skeptics reacted very quickly when claims related to facilitated communication came up. Their magazine, *Skeptiker*, reprinted an article by Gina Green and benefited from the experience gained in Australia and the United States.

With the twenty-first–century trend of "alternative facts" well underway, the time is ripe for revitalizing a vision for the future.

Working across the Globe

There are now skeptic and rationalist organizations all over the world. But we also need networking between skeptics globally to help us all be more effective and efficient. Science has been doing this all along. This kind of networking must be at the heart of our future work.

However, it remains essential that we do not make the mistake many other NGOs have made. Every country and region has its specific problems and approach. The network of skeptical organizations must learn from each other and at the same time avoid imposing on each other.

These considerations also frame the ability and limitations of organizations, such as ECSO, the European Council of Skeptical Organisations. ECSO was formed to bring together skeptical organizations in Europe. Organizations such as ECSO must focus on facilitating the exchange of information, promoting the creation of new groups, and organizing events to bring people from all over a region or the world together. They can reflect shared values, motivations, and scopes, but they should not tell individual organizations what to do.

At every level, it will always be a challenge to achieve the right mix between useful consolidation and individuality to avoid fragmentation. Should we consolidate the movement based on language, country, or region? How large or small should these regions be? Those concerned need to decide how to solve this on a case-by-case basis, and I do not see a one-size-fits-all formula to solve this problem.

Skeptics Are Human

We have been fortunate to have all sorts of people driving the skeptical movement and ensuring that it moves on. Some are doers who form the backbone. They make sure that the organizations keep running, magazines keep being published, and events keep happening. We also need leaders who organize skepticism and keep individual organizations across the world together. Then there are personalities such as James Randi who inspire us all. A healthy combination of this diversity helps us all.

If we want others to see us as pushing a universal cause, we must also ensure diversity in a different sense of the word. Skeptical groups must have women and individuals from minority communities in visible positions. Increasing diversity requires particular and constant attention.

What we do not need are those who put themselves above the movement. When we do involve stars, we need to make sure that they will benefit our cause and not just use our common cause to boost their reputations.

However, it is unavoidable that, in the long run, we will have problems with well-known and lesser-known skeptics. Problematic people are not unique to skeptical organizations, but they are something that the movement, and particularly its leaders, will have to manage.

Being a skeptic does not mean that we are all good people. A few may not be. Similarly, some of those we argue against may have good intentions. Within skeptical organizations, we will have to be just and take action, defending those who interested parties accuse unjustly, as well as acting firmly on unacceptable behavior. We have to prepare for even unlikely occurrences and ensure that mechanisms are in place to prevent misbehavior such as sexual harassment. It is the job of the leaders of the skeptical movement to deal with such problems and issues. These issues will not go away but will remain a constant challenge.

Professionalization

One prominent limitation is that skeptics are all far too dependent on voluntary activity. We need more skeptics who can do this as a paid job. The problem is very often the lack of funds. Marko Kovic from the Swiss skeptics makes a valid point when he writes: "One of the highest priorities of skeptical organizations should be to generate revenue streams that are as large and as sustainable as possible" (https://www.skeptiker.ch/some-problems-of-the-skeptic-movement/).

There have been three ways to generate revenue. The first is via membership of organizations, which has been the prime source of income for the German skeptics organization GWUP. The second is via donations and bequests, which is the way other organizations work, CSI and the Australian Skeptics being two examples. The third is what almost all organizations do anyway: providing services and products, such as a magazine or events.

We are unwilling to accept the dangers caused by alternative facts and pseudoscientific claims.

It is the first two that can significantly improve the financial basis of cause-based organizations. We have not yet been able to present our cause and why we do what we do well enough. Much more than what we do, we have to clearly communicate why we put in all our time and effort. We are unwilling to accept the dangers caused by alternative facts and pseudoscientific claims.

Skeptical organizations should not show themselves as primarily places for careers. They must build on our cause as the primary motivator, followed by the fun of doing things, with career considerations coming last.

Branding

So who are we? Should we call ourselves "skeptics" despite the negative connotation? Does it match our vision and purpose?

I think we should be pragmatic here. The term *skeptic* does often convey a negative association, and some use it in a way we don't like. We oppose climate "skeptics" and refuse to accept the term in this connection.

At the same time, we as a movement have been known as skeptics. With any search on the internet for skeptic (or "Skeptiker" in German), we show up rather than the climate or GMO "skeptics."

Not only will it be a waste of resources looking for a new word or brand, but this will also detract from our actual purpose and work. We have been able to establish the term *scientific skepticism*. What we need to do whenever we show up is to say, it is we who are the skeptics. The others are not. Let us identify our cause, our mission, and our community as skeptics when we do what we do.

Reform or Refocus?

We have come a long way since the 1970s. Some skeptical organizations started in the nineteenth century. The *Vereniging tegen de Kwakzalverij*, the association against quackery in the Netherlands, was founded in 1881. *Comité Para* in Belgium took off in 1949. There is a lot we have achieved, and we all have an excellent reason to be proud of it. We are here to stay.

But we also have much further to go. We should never be satisfied with what we have achieved; instead we must build for the future. As a movement and with organizations that are independent of specific or vested interests, we are more credible than most.

So here is my take on our future priorities:

1. Get a consistent message out on the skeptical movement. Focus on what drives us and why we are needed. The "why" is at the very core to motivate and grow skeptical groups.
2. Define a skeptic as one who adheres to scientific skepticism.
3. Prioritize on topics having the most significant potential for harm, be it directly or by omission. At the same time, let those with a strong motivation continue working on their favorite subjects. You never know when they may turn out to be critical.
4. Make use of the immense global resources of skeptics. Involve women and people from minority communities. Network across countries and regions.
5. Support those who work under the hardest social and economic conditions, such as in Africa. Don't be condescending, and provide advice only when asked.
6. Make it clear that we are the people who are not committed to any interest groups and who will stand up for science and critical thinking even if it means alienating some of our "friends." Our independence from interest and pressure groups is what makes us different. It is, as some would say, our unique selling point.

Let us make it clear that we have a cause of utmost significance with the challenges of the twenty-first century in view and that this requires support, both work and financial resources. Should it not be on everyone's agenda to not be deceived or harmed? Let us get on with it! ■

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Lotus Birth

An alternative birth practice called lotus birth—not cutting the umbilical cord after delivery—is a poorly studied phenomenon with high risks and low benefits. It's also not traditional; the fad dates back only to the 1970s.

KAVIN SENAPATHY

Known in proponent circles as "lotus birth," umbilical nonseverance is a practice in which the umbilical cord is not cut post-birth, leaving the baby attached to the placenta until the cord dries and eventually detaches from the navel—usually a period of three to ten days. Little information has been published on the safety or medical benefit of this practice. Those engaging in lotus birth often keep the placenta in a pouch or a bowl to dry, with salt and optional dried herbs and essentials oils to aid in the drying process and to mask the odor of the decomposing placenta. These supplies are sold in kits from local sellers or through online shops such as Etsy, though lotus birthers also share tips on how to prepare concoctions at home. Some proponents distinguish between "full" and "short term" lotus births, in which the cord is cut four to forty-eight hours following birth.

A typical lotus birth protocol proceeds as follows:

- When the baby is born, leave the umbilical cord intact. If the cord is around the baby's neck, simply lift it over.
- Wait for the natural delivery of the placenta. Do not use oxytocin, as this forces too much too soon into the infant and compromises the placenta delivery.
- When the placenta delivers, place it into a receiving bowl beside the mother.
- Wait for full transfusion of the umbilical blood into the baby before handling the placenta.
- Gently wash the placenta with warm water and pat dry.

- Place the placenta into a sieve or colander for 24hrs to allow drainage.
- Wrap the placenta in absorbent material, a nappy or cloth and put in into a placenta bag. The covering is changed daily or more often if seepage occurs. Alternatively, the placenta may be laid on a bed of sea salt (which is changed daily) and liberally covered with salt.
- The baby is held and fed as the mother wishes.
- The baby is clothed loosely.
- The baby can be bathed as usual; keep the placenta with it.
- Keep movement to a minimum. (Taylor 2018)

Early History

Considered a recent alternative birth phenomenon, the roots of lotus birth as currently practiced can be traced back only a few decades. With a vague but unconfirmed notion that some non-human primates don't sever the umbilical cord, a pregnant woman named Clair Lotus Day from California began to question routine cutting of the cord back in the 1970s. Australian doctor and lotus birth proponent Sarah Buckley writes that Day's "searching led her to an obstetrician who was sympathetic to her wishes and her son Trimurti was born in hospital and taken home with his cord uncut" (Buckley 2009, 40). The practice has been growing since 1974, with the late yoga master and midwife Jeannine Parvati Baker credited with popularizing lotus birth in the United States and midwife Shivam Rachana, founder of the International College of Spiritual Midwifery and author of the book *Lotus Birth* (2000), spreading the practice in Australia.

The "prolonged contact" with the placenta that a lotus birth provides "can be seen as a time of transition, allowing the baby to slowly and gently release their attachment to the mother's body," writes Buckley.

Placenta rituals among Australian home birthing women have been described as use of the organ "in various rituals and ceremonies to spiritualize an aspect of birth that is usually overlooked," including lotus birth, burial of the placenta beneath a specifically chosen plant, and consuming the placenta (placentophagy) (Burns 2014).

The prevalence of lotus birth around the world is unclear.

Buckley writes that "since 1974, many babies have been born this way, including babies born at home and in hospital, on land and in water, and even by caesarean section" (Buckley 2009, 41). Lotus birth remains rare in hospital settings. The practice appears to be more common in out-of-hospital births, with discussions and advice-sharing on lotus birth in parenting forums on Facebook and WhatToExpect.com. A search of Facebook as of publication turns up a few active discussion groups, including "Lotus Birth/Umbilical Non-severance" with over 600 members, "Lotus Birthing" with over 400 members, and Italy-based forum "LOTUS BIRTH ITALIA" with over 2,000 members. Members of these forums share advice, anecdotes, and photos.

Related Practices and Unproven Claims

Mention of lotus birth in the medical literature is sparse, though case studies have been documented since the 1970s. Proponents tend to hold the placenta in high regard, wishing to honor the organ, citing both abstract and specific benefits.

"We need to relearn what a birth can be like when it is not disturbed by the cultural milieu. We need a reference point from which we should try not to deviate too much. Lotus Birth is such a reference point," writes Dr. Michel Odent, surgeon and proponent of lotus birth and other risky feats such as water birth, dubbed the "French birthing guru," in the foreword to the 2001 book *Lotus Birth*. Some lotus birth advocates suggest that cutting the cord causes lifelong psychological trauma. Proponents have shared accounts of adults remembering the trauma upon encountering the concept of lotus birth ("Lotus Birth" 2017). Buckley (2009) writes, "I notice an integrity and self-possession with my lotus-born children, and I believe that lovingness, cohesion, attunement to Mother Nature, and trust and respect for the natural order have all been imprinted on our family by our honouring of the placenta, the Tree of Life" (43).

Aside from spiritual benefits, lotus birthers and proponents also believe in medical benefits. Popular Australian parenting site BellyBelly shares a few purported benefits ("Lotus Birth: 7 Reasons" 2018), including optimal blood transfer: "The placenta is placed at the same level with the baby to ensure the blood transfer. An extra 80-100mL of the oxygenated blood can contribute towards their brain development within the first year." There is evidence in favor of delaying cord clamping, though there are gaps in the existing evidence regarding "the optimal time to clamp the cord and the interventions that should be performed before clamping in infants who fail to establish spontaneous respirations or are severely asphyxiated, as well as those who breathe spontaneously" (Niermeyer 2015).

Current management recommendations do not exist for lotus birth in the United States. However, there are management recommendations for the next most closely related newborn practice—delayed cord clamping—for which there is evidence of benefit to the newborn. The American College of Obstetricians and Gynecologists (2017) issued a committee opinion, endorsed by the American Academy of Pediatrics and the American College of Nurse–Midwives, with recommendations regarding the timing of umbilical cord clamping after birth:

- In term infants, delayed umbilical cord clamping increases hemoglobin levels at birth and improves iron stores in the first several months of life, which may have a favorable effect on developmental outcomes.
- Delayed umbilical cord clamping is associated with significant neonatal benefits in preterm infants, including improved transitional circulation, better establishment of red blood cell volume, decreased need for blood transfusion, and lower incidence of necrotizing enterocolitis and intraventricular hemorrhage.
- Given the benefits to most newborns and concordant with other professional organizations, the American College of Obstetricians and Gynecologists now recommends a delay in umbilical cord clamping in vigorous term and preterm infants for at least 30–60 seconds after birth.

Considered a recent alternative birth phenomenon, the roots of lotus birth as currently practiced can be traced back only a few decades.

- There is a small increase in the incidence of jaundice that requires phototherapy in term infants undergoing delayed umbilical cord clamping. Consequently, obstetrician–gynecologists and other obstetric care providers adopting delayed umbilical cord clamping in term infants should ensure that mechanisms are in place to monitor and treat neonatal jaundice.
- Delayed umbilical cord clamping does not increase the risk of postpartum hemorrhage.

The Royal College of Obstetricians & Gynaecologists issued a statement acknowledging that "(RCOG) is aware that a small number of women are choosing umbilical non-severance, or 'lotus birth,'" and stressing that "the practice of lotus birth is new to the UK and there is a lack of research regarding its safety" (Royal College of Obstetricians & Gynaecologists 2008). In the statement, Dr. Patrick O'Brien, RCOG spokesperson, said:

> If left for a period of time after the birth, there is a risk of infection in the placenta which can consequently spread to the baby. The placenta is particularly prone to infection as it contains blood. Within a short time after birth, once the umbilical cord has stopped pulsating, the placenta has no circulation and is essentially dead tissue.

RCOG published a scientific impact paper reviewing the body of evidence suggesting that deferred rather than immediate clamping may have benefits at both term and preterm births (Royal College of Obstetricians & Gynaecologists 2015).

Risks, Outcomes, and Commentary

Though lotus birth is not well-documented as a practice in medical literature, negative health outcomes have been doc-

umented, including infection and idiopathic neonatal hepatitis (Tricarico et al. 2017). Lotus birthing also requires the primary caregiver—almost always the mother—to remain close to a bag of decomposing flesh, and it keeps her homebound as she cares for the newborn until the umbilical cord detaches.

Dubbing it "the wackiest childbirth practice ever," Dr. Amy Tuteur, a vocal critic of the natural childbirth movement, describes lotus birth as "a bizarre practice with no medical benefit and considerable risk, particularly the risk of massive infection." She explains the phenomenon: "What's the real reason behind lotus birth? Homebirth and other fringe birth advocates are engaged in a battle of oneupsmanship, and the woman with the most bizarre (and often the most dangerous) birth practices wins" (Tuteur 2012).

Mention of lotus birth in the medical literature is sparse, though case studies have been documented since the 1970s. Proponents tend to hold the placenta in high regard, wishing to honor the organ, citing both abstract and specific benefits.

Jennifer Gunter, Canadian-American gynecologist, obstetrician, vaginal health expert, and author, writes on her blog that lotus birth is "biologically unsound [and] untested," adding that it is "the equivalent of diapering up a raw steak and attaching to your newborn for three to five days. It is not a magical, historical, or cultural practice forcibly torn away from women by an uncaring patriarchy; it was something a woman dreamed up after hearing about chimpanzees. To brand this as a modern ritual is nothing but predatory marketing" (Gunter 2017).

Kristina Bryant, a pediatrician specializing in infectious diseases, suspects that peer pressure to choose the most natural birth options plays a role in the proliferation of lotus birth. She writes that "many pediatricians, me included, are not well informed about these practices and don't routinely ask expectant moms about their plans. I propose that we can advocate for our patients-to-be by learning about these practices so that we can engage in an honest, respectful discussion about potential risks and benefits. For me, for now, the risks outweigh the benefits" (Bryant 2017).

Lotus birth is poorly studied, and experts largely agree that this is for good reason—there is no need to legitimize a high-risk, no-benefit phenomenon that didn't start until the 1970s. Nevertheless, awareness of lotus birth, the reasons proponents cite for doing it, and management of those who choose it, should be on the radars of medical practitioners. Along with refusal of other newborn nursery protocols, including refusal of intramuscular vitamin K, erythromycin eye ointment, newborn screening for congenital conditions, hepatitis B vaccination, discharge timing, and recommended sleep position, "providers need to be aware of alternative practices and know how to respond to them with patient-centered yet medically safe care" (Monroe et al. 2018). ■

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Speed Reading: Fact or Fiction?

Is training in speed reading valuable? It depends.

WILLIAM VANDERLINDE

Several years ago, I came across the manual for a self-paced speed reading course. Intrigued by promises of reading thousands of words per minute, I worked my way through the book. To my disappointment, my reading speed did not improve very much. I re-read the instructions and was urged to go faster! Skip words! Ignore the unimportant stuff! I did all that and my speed improved, but my understanding and retention of what I read dropped dramatically. I concluded that for some reason I just wasn't a good candidate for speed reading. Much later I learned that my experience was quite typical.

The term *speed reading* was coined by a school teacher named Evelyn Wood in the 1950s.

People typically read about 250 to 300 words per minute. Wood claimed to greatly speed up reading by eliminating subvocalization and looking at groups of words instead of individual words. She would also use her finger as a guide to the eye, running it straight down the middle of a page at high speed. She began teaching speed reading seminars, and in 1959 she founded the Evelyn Wood Reading Dynamics Institute in Washington, D.C. Students were promised they could increase their reading speed by two to five times, with *improved* comprehension. Some of her students allegedly could read 6,000 words per minute. Wood herself claimed to read anywhere from 2,700 words per minute to 15,000 words per minute depending on content (Van Gelder 1995). At 15,000 words per minute, you could read *Gone with the Wind* in twenty-eight minutes. Many people are skeptical that reading at this speed results in any real comprehension of the material. As Woody Allen sarcastically commented, "I took a course in speed reading and read *War and Peace* in 20 minutes. It's about Russia" (Oliver 1995).

President Kennedy sent many staff members to Reading Dynamics courses, as did Presidents Nixon and Carter. At its peak, Evelyn Wood Reading Dynamics seminars were taught

at more than 150 outlets. Evelyn Wood died in 1995, but her methods are still taught through Fred Pryor Seminars.

There are some people who do have a natural ability to read extraordinarily fast with high comprehension. For example, Kim Peak (the model for Dustin Hoffman's character in the film *Rain Man*) was reported to have memorized the contents of 12,000 books and could read at more than 4,000 words per minute. However, Peak had an abnormal brain structure, had difficulty with routine physical tasks such as walking and buttoning a shirt, and scored below average on standard IQ tests (Weber 2009). For this article I'll exclude speed reading claims associated with savants.

Academic studies of speed reading have had difficulty confirming the more extreme claims. Many early studies in the 1960s reported very high reading speeds from 2,000 to 10,000 words per minute but lacked proper measures of reading comprehension or didn't have control groups. In one case, speed readers scored "68% comprehension," but people who had never read the passage scored 57 percent (Carver 1971). Speed readers were generally found to have a poor grasp of detailed content but a good grasp of the main theme and could perform well at tasks such as producing an outline of the text. A key feature of speed reading was that the readers made fewer and quicker eye fixations on the page. A typical reader's eye will fixate for about one-fourth to one-half second on perhaps every other word, with the remainder being filled in by peripheral vision or from context. Speed readers have far fewer fixations and spend less time on each, typically 1/10 to 3/10 of a second. Thomas described a reader with a reading rate of 10,000 words per minute who only made six eye fixations per page, scanning vertically downward on the left hand page and upward on the right. The reader made no fixations at all on the bottom third of the page. It was unclear what comprehension was demonstrated by this reader (Thomas 1962).

Perhaps most interesting was a study in which graduates of a speed reading course were presented with a text in which, unknown to them, every alternate line was taken from one of two unrelated source documents. Speed readers read this text at an average rate of 1,700 words per minute and claimed to have good understanding of it, *but none of the speed readers noticed that the material was from two different sources*. The speed readers did not attend to details or local coherence between ideas (Ehrlich 1963).

Perhaps the most thorough and conclusive study of speed reading was conducted by Michael Masson (Just et al. 1982). Study participants were recruited, some of whom had completed Evelyn Wood Reading Dynamics, and others were a control group of normal readers. As of the early 1980s, Reading Dynamics focused on two aspects of reading: making fewer and faster eye fixations, and using previous knowledge of the subject to organize the information that is read.

Students had been instructed in Evelyn Wood's method of using their hand as a pacer, moving it across the text at a rapid speed. The instructor and the students were under the impression that these hand motions guided the eye to fixation locations; however, Masson's research demonstrated that the hand motion acted more like a metronome than a pointer. The hand and eye beat out a similar rhythm, but the eye did not actually follow the hand motion.

Evelyn Wood claimed to read upward of 15,000 words per minute depending on content. At 15,000 words per minute, you could read *Gone with the Wind* in twenty-eight minutes.

The Evelyn Wood class also emphasized the understanding of how different types of texts are organized, such as textbooks, newspaper articles, and stories. For example, students were trained to read textbook passages by skimming the table of contents, titles, headings, and illustrations while using previous knowledge of the topic to fill in the gaps. These techniques are similar to research skills used by many people. For example, Martin Gardner was once asked how he could review so many books, and he answered that he did not actually read most books he reviewed; he just looked at the index and that gave him all the information he needed to write his review (Hyman 2010).

Masson's research study consisted of three groups of college students: normal readers, trained speed readers, and "skimmers," i.e., normal readers who were encouraged to skim the text at a rapid pace. A relatively simple passage was taken from *Readers Digest* and a more demanding one from *Scientific American*. In both cases, the results were the same: speed readers were about three times faster than normal readers, but their reading comprehension was much lower and decreased

as their reading speed increased. The speed readers were only slightly faster and better at comprehension than the skimmers, although the speed readers performed well at tasks such as preparing an outline of the text. One could easily conclude that speed reading is basically a form of skimming, making use of study skills commonly used by college students.

The recent popularity of hand-held wireless devices has led to a renewed interest in speed reading. Apps are now available that will present one word at a time on the screen (Chen 2014). Users can increase the speed to the point where they feel they are just catching all the words, typically about 50 percent faster than their normal rate. Reading speed increases because there is no time lost in moving the eye to a new fixation point. Actually, this technique has been around for decades under the name Rapid Serial Visual Presentation (RSVP), but it used to require special equipment. Studies have shown that RSVP does increase speed but it also reduces comprehension because readers cannot look back at previous words. RSVP also prevents the reader from using the structure of the text to skim for key content.

Returning to my original question, is training in speed reading valuable? It really depends on what sort of material you read and what you want to get out of it. For those of us who read highly technical material that requires careful study of each sentence, speed reading may not have much to offer. However, for people who need to skim a large amount of material or need to improve their study skills, a speed reading course just might be worth it. ■

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Skepticism and Literature in Nineteenth-Century Spain

A nineteenth-century Spanish story offers a devastating critique of pseudomedicine. In at least twelve ways, it anticipates the bogus rationales offered for today's quack medicine.

AZUCENA LÓPEZ MÁRQUEZ AND ANTONIO G. VALDECASAS

"… take me to Spain."
—"Spanish Caravan," The Doors

The idea of Spain in the minds of foreign visitors has evolved substantially over the past three centuries. From an illiterate and savage country whose outlook may be synthesized in the dictum attributed to Voltaire that "Africa begins in the Pyrenees" or the commentary of Casanova upon entering Spain in 1767 ("Wretched Spain!") (Casanova 1894), to its later transformation into a romantic and exotic place full of brave men and passionate women. This latter vision persisted and was made universal in the twentieth century through portraits of the Spanish Civil War (1936–1939) as depicted in the narratives of Hemingway and Orwell, among many others. From these, Spain's devotion for bullfighting was then singled out as representative of the country as narrated in Hemingway's novel *The Sun Also Rises*, which made Pamplona's San Fermín celebrations famous worldwide. This oversimplified depiction of a highly diverse Spanish society was insightfully analyzed by the expert musicologist Judith Etzion in her landmark work on the Spanish fandango (Etzion 1993), a style of music and dance popular in eighteenth-century Spain. The truth is that many different "Spains" have existed in the Iberian Peninsula over the past three centuries and that different travelers have found what they were looking for, choosing to single out only one of many different realities.

Despite the presumed transition from an uncultured nation to a romantic and exotic one, disdain for science in Spanish society has been a traditional view that has remained constant during this time. Jules Verne best conveys the international view of science in nineteenth-century Spain. In his novel *From the Earth to the Moon*, originally published in 1865, Verne describes the international contribution to the cost of the voyage to the moon, for which he states:

> As to Spain, she could not scrape together more than 110 reals. She gave as an excuse that she had her railways to finish. *The truth is, that science is not favorably regarded in that country*, it is still in a backward state; and, moreover, certain Spaniards, not by any means the least educated, did not form a correct estimate of the bulk of the projectile compared with that of the moon. They feared that it would disturb the established order of things. In that case it were better to keep aloof; which they did to the tune of some reals. (Verne [1865] 1900; emphasis added)

However, no one would deny that different social strata existed, some with very cultivated people seriously interested in the advancement of scientific knowledge. Emilio Huelin, author of the collected articles *Cronicón Cientifico Popular* (*Popular Scientific Chronicle*), is an excellent example of one of these intellectuals who wanted to disseminate scientific knowledge to the wider society (Huelin 1877). Indeed, a review published in the scientific journal *Nature* of Huelin's first volume of work written in Spanish is a testimony of his important contribution:

> We perused this volume with interest and pleasant surprise; we were pleased at finding it to be an excellent and well-written review of all new occurrences in the scientific world, and we were surprised to see such a work emanate from a country which hitherto has contributed but too small a share towards the progress and welfare of science. (A.G.B. 1877)

Other authors, with the same purpose of promoting scientific literacy within the general public, used literature as a means to cultivate public rationality. As an example, here we analyze one of the best narratives to illuminate the fraud of pseudomedicine: a story written by José Fernández Bremón titled *Monsieur Dansant, médico aerópata* (1879, *Monsieur Dansant, airpathy physician*). Its devastating critique of pseudomedicine is written in the context of an intriguing story

with superb rhythm and structure.

In short, Monsieur Dansant founds a health business based on air. Different kinds of air, such as cool, warm, humid, fast, and slow (among others), are prescribed for a wide range of ailments. The treatments are usually administered in a splendid clinic built by Dansant's wealthy partner, although specially "packed" air could be sent abroad on demand. This is the basis of the whole story, which also links a somewhat cynical love story with the development of the health business and perfectly illustrates the set of characteristics usually accompanying these kinds of fake cures.

As such, this tale identifies deception and other salient features that should be carefully considered when presented with any proposal of "miraculous cures" in the past, present, and future. All the features that characterize the pseudomedicine are in the story of Dansant, although not all are explicit. Let's examine them in detail.

1. Be careful with the display of academic degrees.
Dansant introduces himself as a doctor, although he has never studied medicine. His knowledge is based mainly on intuition and so-called sympathetic medicine (see below). However, being called a doctor gives him some level of legitimacy, as this word is usually associated with practitioners of medicine.

The skeptical literature is full of debates with authors who call themselves doctors or who indeed have doctoral degrees, such as parapsychologists Rupert Sheldrake and Russel Targ. However, academic degrees are not passports to truth. Academic degrees do not necessarily give legitimacy to a person's beliefs. There is no guarantee of truth just because one claims to be transmitting "knowledge." The final arbitration of knowledge is played out in scientific journals, not in newspapers and popular science books. So, be careful with the exhibition of academic degrees as a passport to truth.

2. Rhetorical vocabulary may hide the lack of factual substance.
Pseudoscience uses two vocabulary-related strategies to try to give the perception of authority. On the one hand, it borrows common scientific terms to make their discourse seem credible. Terms such as *energy*, *waves*, *frequency*, and *vibrations* are common in the pseudoscience literature, but they are not used according to their proper definitions based on physics. On the other hand, pseudoscience uses less common words that are not necessarily connected with science but transmit a sense of deepness and wisdom. Typical examples include *astral projections*, *crystal therapy*, and *biological recodification*, among others.

3. Beware of excuses and justifications given when the expected result of a treatment is not obtained.
In the scientific treatment of diseases, when the application of a remedy does not have the desired effect, the explanation provided may focus on the specific role the substance plays in the targeted organ or tissue. The rationality of how a remedy works is reflected in the rationality of the lack of effect. Pseudomedicine explanations do not have this rationality. Rather, the all-inclusive excuse that "in some cases, it does not work" is often invoked. This is precisely the justification given by Dansant when patients ask why they are not getting better.

4. The use of large urban or foreign (far and exotic) places to authenticate the message.
Humans are social beings, and social context gives meaning to them. Context can provide a hint of seriousness and legitimacy, but it may also convey deception. London and New York have large numbers of conjurers and healers, and saying that you have been "practicing in New York" is an empty phrase. (If you have been teaching at Columbia University, for example, it may be another matter.)

Despite the presumed transition from an uncultured nation to a romantic and exotic one, disdain for science in Spanish society has been a traditional view that has remained constant during this time.

5. The fact that a book has been published in different countries and languages does not necessarily fill it with more veracity.
The Bible is a book that has been translated into almost all languages, yet this does not make it more reliable concerning the origins of the universe or biodiversity.

Another example is L. Ron Hubbard's *Dianetics*, which was first proposed as a "model of the mind." But when it was questioned as being pseudoscience, it transformed into a credo of the Scientology religion.

6. The likelihood of superficial explanations
Pseudorational explanations appear to have some degree of authenticity, although they may lack any kind of causal connection between the diseases and cures. Practitioners of sympathetic medicine believe that some diseases are best treated with things related to the disease (Stevens 2001). A good example is the belief within folklore medicine that the consumption of certain animal parts, such as rhinoceros horn, is the best cure for virility problems. In the same guise, Dansant approaches disease using the "sympathetic" methodology, prescribing hot air to treat a common cold or fresh air for a nervous breakdown and so on.

7. Uncertainty is not a question of zeros and ones but of degrees.
Degrees of uncertainty drive science and research but not to defend the idea that "everything may be valid." The dictum "everything is connected with everything" lacks meaning. Everything admits degrees, and the connection between different causes and effects can only be elucidated by research. Parodying a popular statement of chaos theory, we may say that "when a citizen sneezes in New York, it may have an effect on someone in Tokyo," but if truly deserved, an investigation could be carried out to test this hypothe-

sis. Moreover, diffuse holism is not a reason to think that everything is relative. The truth is that some relationships are more uncertain than others, and human progress and knowledge has been built on the reduction of uncertainty.

Different kinds of air may affect human health differently. However, this is a matter of research. In fact, we already know a lot about the effects of urban air on human health as the result of an in-depth study of components and effects (Kolok 2016).

8. Playing on the hopes and fears of patients
The best indication of a fake cure is when it enthusiastically plays with the patient's hopes, promising results that no other may offer.

As such, this tale identifies deception and other salient features that should be carefully considered when presented with any proposal of "miraculous cures" in the past, present, and future.

9. Superficial altruism for added credibility
There are many kinds of altruism. The worst is superficial altruism, which involves only being generous to gain more than invested. This kind of behavior is usually found in deceivers.

10. External appearance is not necessarily related to the quality of content and truth.
Big buildings and lavish installations do not signify the efficacy of a therapy or treatment. This rule works in other areas as well. Not so long ago, the evolutionist Leigh Van Valen founded the journal *Evolutionary Theory* with the motto "primacy of content over display." The opposite may be said of many pseudomedicines, which prioritize display over content.

11. Conflict with different proposals or with academic practices may increase popularity but is unrelated to plausibility.
As the Spanish saying goes, *cuando el río suena, agua lleva* (when the stream rings, it is because it carries water). According to our analysis, some people may be led to believe that just because there is some controversy about pseudomedicine, at least an atom of truth may exist on all sides. This relativistic thinking is misguided and dangerous.

12. Signs of improvement after a treatment are not always directly related to the treatment administered.
Placebo effects may play a role in the preliminary phases of alternative medicine treatments. However, the important point is whether this "improvement" continues and develops into a new state of health. The mind is an incredible tool: it can self-help but also self-deceive. In some cases, the feeling of improvement may have a hidden cause. A somewhat famous case in Spain involved the alternative treatment of a child with cancer by a healer. The parents were very happy at the beginning of the treatment, as the child showed changes in energy and happiness. However, all these signs quickly declined, and the child died not long afterward. It was later discovered that the healer had prescribed the child a tincture laced with cocaine (see https://elpais.com/diario/1994/06/02/sociedad/770508003_850215.html).

Bremón's literary work has surprisingly and brilliantly described the main characteristics on which pseudomedicines base their promotion. This short story deserves to be better known, which should not be a costly task given the number of translation tools available today. ■

Further Reading

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Dead Varmint Vision at Its Funniest

An Alleged Dinosaur with Breasts in a Medieval Carving

A ninth-century carving on an English church depicts a carnivorous dinosaur with breasts, verifying human contact with dinosaurs and corroborating a biblical passage on dinosaurs suckling their young. Or not.

PHILIP J. SENTER

According to the young-Earth creationist (YEC) worldview, God created the Earth, humans, and all other kinds of organisms independently during the same week about 6,000 years ago, as described in the book of Genesis. This worldview rejects the overwhelming physical evidence that the Earth is over 4.5 billion years old (Gradstein et al. 2004), that all organisms on it evolved from a common ancestor (Prothero 2007), that non-avian dinosaurs became extinct about 65 million years ago (Wicander and Monroe 2016), and that humans (*Homo sapiens*) did not arise until about 0.3 million years ago (Hublin et al. 2017) and therefore are separated from non-avian dinosaurs by millions of years. To support the YEC view that humans and non-avian dinosaurs were contemporaries, YEC authors frequently claim that ancient or medieval artwork depicts dinosaurs. Investigation of such claims shows that they are usually based on ludicrous misinterpretations of the artifacts in question (Senter 2012a; 2013; Senter et al. 2013; Senter and Klein 2014).

Previously I introduced the terms *dead varmint vision* and *apnotheriopia* (literally, "dead-beast vision") to denote the tendency of YEC authors to erroneously see dinosaurs and other prehistoric animals (dead varmints) in ancient art (Senter 2013). Here, I report a case in which dead varmint vision has presented itself with a particularly entertaining twist: a claim that a medieval carving depicts a dinosaur with breasts and that breastfeeding dinosaurs are mentioned in the Bible. From melon-eating tyrannosaurs (Senter 2012b) to fire-breathing duckbills (Senter 2017), the absurd dinosaur-related claims that the YEC movement regularly spawns often have particularly high entertainment value, but the notion that dinosaurs had breasts surely takes the cake. It could aptly be dubbed the voluptuous varmint myth.

To fully appreciate the voluptuous varmint myth, it is necessary to first grasp the elements of its backstory. These include the *Beowulf* epic and a biblical passage that mentions an animal that the ancient Hebrews called a *tannîn*. *Beowulf*, a medieval English narrative, includes a scene in which the hero, Beowulf, kills a monster named Grendel and another scene in which Beowulf kills Grendel's mother. Grendel and his mother are described in the epic as humanoid creatures (lines 1350–1355). Grendel has head hair (line 1647) and carries a patchwork pouch (lines 2085–2092). Grendel's mother wields a knife (line 1545), keeps a fire burning in her home (line 15516–1517), and is a descendant of Cain (line 1258–1268) (Alexander 1973; Swanton 1997). These are all traits that are consistent with the human body form and human behavior, and they are inconsistent with dinosaurs. Even so, some YEC authors absurdly contend that Grendel and his mother were dinosaurs (see Siebert 2013), and that contention is an important part of the voluptuous varmint myth.

Another part of the backstory of the voluptuous varmint myth is Lamentations 4:1–8. That biblical passage poetically describes the aftermath of the destruction of Jerusalem by the Babylonians as a topsy-turvy time when things have characteristics that are the opposites of their normal ones. Gold is no longer shiny, gemstones that had been collected are now strewn, the once-precious "sons of Zion" are now as worthless as clay, serpents are suckling their young, human mothers aren't suckling theirs, the rich are now poor, and the pure Nazirites are now impure. In short, nothing is as it normally is.

The Hebrew word for "serpent" in verse 4:3 is *tannîn*. Although some researchers mistakenly interpret the word *tannîn* as a term for a kind of mythical sea monster (Kiessling 1970; Wakeman 1973; Day 1985; Heider 1995), it is easy to demonstrate that it means "serpent." In Exodus 7:8–12, Aaron's staff becomes a *tannîn*, and in verses 15–21, God calls Aaron's staff the staff that had become a *nāhāsh* (the generic Hebrew term for "snake"). In Isaiah 27:1, the monster Leviathan is called a *nāhāsh* and a *tannîn*. These two passages demonstrate that the terms *nāhāsh* and *tannîn* are equivalent. Furthermore, couplets in Deuteronomy 32:33 and Psalm 91:13 equate *tannîn* with *pethen* (a venomous snake). Couplets in which the author

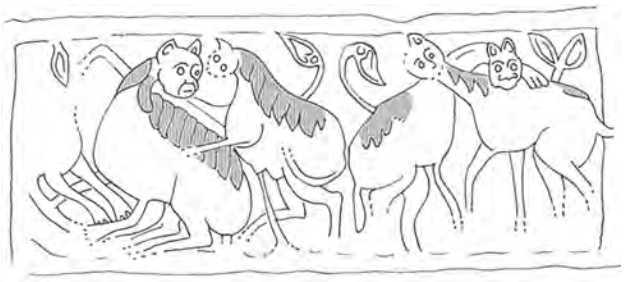

Figure 1. Sketch of the four lions in the stone panel at Breedon-on-the-Hill, after plate LIc of Jewell 1986, with the manes shaded.

says the same thing twice with different words are frequent devices in ancient Hebrew literature, and in these cases, they indicate the equivalence of *tannîn* with "snake." The *tannîn* is scaly (Ezekiel 29:3–4), venomous (Deuteronomy 32:33), and terrestrial (Isaiah 13:22, 34:13, 43:20; Jeremiah 9:11, 10:22, 49:33, 51:37)—all traits consistent with snakes. The mistaken interpretation of *tannîn* as "sea monster" is due to researchers having misunderstood ancient texts on Leviathan, a demonic entity that is described figuratively as a *tannîn* that is imprisoned beneath the sea (Job 41:1:43; Psalm 74:13–14; Psalm 104:26; Isaiah 27:1; Enoch 60:7–8; 2 Baruch 29:4; 4 Esdras 6:49–52). Leviathan is a serpent imprisoned in the abyss of the sea in the same way that Satan is (Revelation 20:1–3): metaphorically, not literally.

The word *tannîn* appears numerous times in the Old Testament, and the Septuagint usually translates *tannîn* as *drakōn*. *Drakōn* is ancient Greek for "serpent," as is amply demonstrated by the numerous ancient Greek artistic depictions of the *drakōn* in myths as a snake and by several ancient Greek texts in which a creature is called a *drakōn* on one line and an *ophis* (snake) on the next (Ogden 2013; Senter 2013; Senter et al. 2016). Eventually, the word *drakōn* gave rise to the word *dragon*, which is the typical English translation of *tannîn* in the King James Version of the Bible, including Lamentations 4:3. Early medieval artists depicted the dragon simply as a snake, but in the late Middle Ages they began to add feathered wings and a pair of limbs (Temple 1976; Mittman 2006). By the end of the Renaissance, the dragon had become a bat-winged quadruped in European art and bore a passing resemblance to Mesozoic reptiles such as dinosaurs and pterosaurs (Allen and Griffiths 1979; Benton 1992; Absalon and Canard 2006; Morrison 2007).

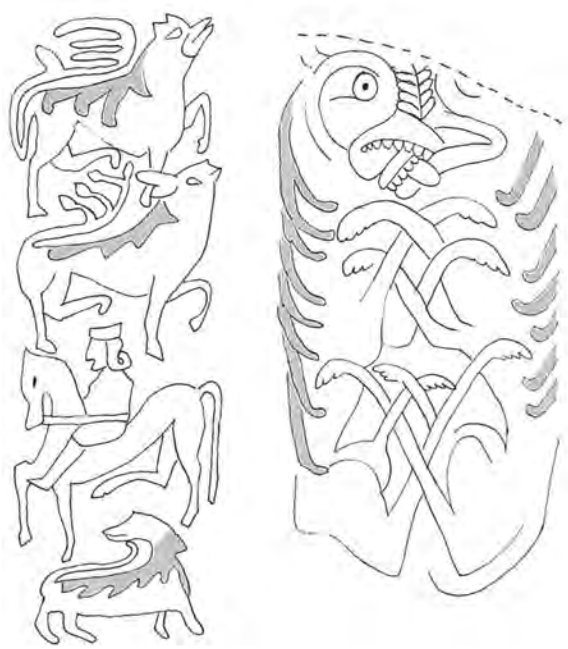

Figure 2. English stone carvings of the eighth century with three lions in one case (left: after Figure 3.29 of Hicks 1993) and a pair of lions in the other (right: after Figure 3.31 of Hicks 1993). Note the multi-lobed manes (shaded) and the narrow limbs and tails, as in the Breedon-on-the-Hill lions.

That passing resemblance prompted the advent of apnotheriopia, which brings us to the case in question: a carved stone panel from the Church of St. Mary and St. Hardulph at Breedon-on-the-Hill, Leicestershire, England (Jewell 1986). On that panel are two pairs of lions, with one lion attacking the other in each pair (Figure 1). Each attacker supports itself upon its hindlimbs while leaning on its victim with its forelimbs, in the manner of a real lion upon its prey. The four lions are highly stylized, as one might expect from an artist in a country where lions are not part of the native fauna. Nonetheless, the leonine nature of the four animals is made evident by the shaggy mane of each, which extends down the dorsal edge of the torso and is multi-lobed, a feature that appears in other lions in English art of the same period (Figure 2). Each also has a short snout that suggests a cat, small ears like a lion's, and a narrow tail that is inconsistent with any animal but a mammal. The panel was carved in the early ninth century (Jewell 1986). Eleven centuries later, thanks to dead varmint vision, the four lions would be misidentified as dinosaurs: three herbivores and a tyrannosaur in need of a brassiere.

In 1992, the YEC periodical *Creation Ex Nihilo Technical Journal* published an article by Bill Cooper titled "The Early History of Man—Part 4. Living Dinosaurs from Anglo-Saxon and Other Early Records" (Cooper 1992). In that article, Cooper cited numerous medieval British myths and legends as "records" of human encounters with dinosaurs and other reptiles presently known only from Mesozoic fossils. He also identified various creatures in medieval British artwork as evidence that humans had encountered dinosaurs and other Mesozoic reptiles. Among those works of art was the Breedon-on-the-Hill panel. Cooper interpreted the attacking lion on the left as a "bipedal predator" and the other three lions as "a herd of grazing *Brontosaurus*-type dinosaurs." Although one of the lions on the right is biting the other, Cooper suggested that the two are "necking," as in the neck-to-neck combat of giraffes, with the unstated implication that the behavior of long-necked ("*Brontosaurus*-type") dinosaurs might have been similar to that of today's long-necked animals. Cooper identified the stylized mane of the "bipedal predator" in the carving as a depiction of dinosaurian armor plating. He posited that the "bipedal predator" was of the same kind as the monster Grendel of the *Beowulf* epic and that Grendel was a "predatory dinosaur." Noting that Grendel had puny arms (in Cooper's imagination, not in the *Beowulf* epic), he implied that Grendel was a tyrannosaur without stating it outright: "I doubt that the reader needs to be guided by me as to which particular species of predatory

dinosaur the details of his physical description fit best."

In the caption to Figure 2 of his article, which illustrates the carved panel, Cooper connected Grendel's mother to the "bipedal predator" in the carving: "Could the sagging skin on the underbelly of this apparently adult creature have fooled the Danes into thinking that most of the adult members of the species were female, mistaking its appearance for mammalian-type breasts, and thus the older creature seen with the young Grendel for Grendel's mother?" In other words, the larger monster in the *Beowulf* epic was portrayed as a female because adult tyrannosaurs had belly folds that medieval Englishmen mistook for breasts.

In a subsequent letter to the editor (Goertzen 1993), YEC author John Goertzen took things a step further, positing that the apparent breasts on the "bipedal predator" of Breedon-on-the-Hill were truly breasts: "the mammary glands on this carnivorous dinosaur were probably real." He then drew a connection with the suckling *tannîn* of Lamentations 4:3: "Figure 2(b) [of Cooper 1992] would tend to support this verse and the interpretation of dinosaur for '*tannim*' [*sic*]. This dinosaur was apparently a mosaic animal, part mammalian and mostly reptilian …." In other words, the "dragons" of the Bible were breasted dinosaurs.

One could not ask for a more variegated collection of misinterpretations nor a more thoroughly comical exemplar of dead varmint vision. As we have seen, the biblical word *tannîn* means "serpent," and the inclusion of the suckling *tannîn* in the Opposite-Day passage of Lamentations 4 indicates that a *tannîn* does not ordinarily suckle its young. Grendel and his mother were humanoid (not to mention imaginary) monsters, not reptilian beasts. No known carnivorous dinosaur was armor-plated. Finally, the lions on the Breedon-on-the-Hill panel are in fact lions, not a herd of *Brontosaurus*-type dinosaurs being attacked by a predatory dinosaur, nor are their manes armor plating.

As I have previously pointed out (Senter 2013), the mistakes of dead varmint vision are avoidable. Cooper and Goertzen could have avoided their particular mistakes by paying more attention to the biblical context of Lamentations 4:3 and other passages on the *tannîn*, by paying more attention to the wording of the *Beowulf* epic, and by studying stylization of animal depictions in early medieval English art. They could also have avoided the massive error that is the YEC worldview by noting the plethora of biblical passages that preach against taking the Pentateuch (which includes Genesis) literally (Senter 2016).

The dinosaurs of the carved panel at Breedon-on-the-Hill exist only in the imaginations of YEC authors with apnotheriopia. The voluptuous varmint myth therefore now joins the long and ever-lengthening list of discredited dinosaur-related claims that YEC authors have put into print, with the merry distinction of winning the laughter prize. ■

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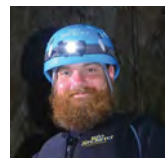


Philip Senter earned a PhD in biological sciences from Northern Illinois University in 2003 and teaches zoology courses at Fayetteville State University in North Carolina. He has published seventy peer-reviewed articles on dinosaur paleontology, reptile biology, and the creation-evolution debate. He wrote on claims of fire-breathing dinosaurs in our July/August 2017 issue.

Response to Ken Ham and YouTube Comments by Andrew Snelling

Lorence G. Collins

After my article "Twenty-One Reasons Noah's Worldwide Flood Never Happened" was published in the March/April 2018 Skeptical Inquirer, the creationist organization Answers in Genesis produced a YouTube video in which Andrew Snelling criticized some of the reasons I presented in the article for why such a worldwide flood could not have happened (see https://answersingenesis.org/blogs/ken-ham/2018/04/02/christian-equips-atheists-debate-christians/). Snelling, a geologist, is director of research for Answers in Genesis. As a lead-in to this video, Ken Ham pointed out that there were many people working for Answers in Genesis with PhDs who are well trained in science and who support the interpretations presented by Snelling, and he implied that my science was not as good as theirs.

In the course of the video, Snelling argues that I have preconceived uniformitarianism views that differ from the biblical ones that the young-Earth creationists have. However, in either case, because the creationists call themselves "creation scientists," our differences in opinion must be based on scientific evidence and not necessarily on our positions with respect to interpreting the Bible. The young-Earth creationists interpret it with a literal translation, whereas I and most other mainline Christians who are scientists do not believe that the Bible was written to be a science textbook. I believe that the Hebrew authors of the Old Testament of the Bible were inspired and wrote their books based on their understanding of what they thought they knew during the time in which they lived. I believe that the Bible portrays who God (the Creator) is, why he created the universe, the Earth, and life (including humans), and how to obtain salvation. It does not answer the questions of when, where, and how creation was done. Science answers these questions.

In Ken Ham's introduction and in the video, there was no attack on me for being a Christian, but he, Snelling, and others from Answers in Genesis were irked that I had published the article in Skeptical Inquirer and gave ammunition to atheists to attack the young-Earth creationists. Snelling essentially threw down the gauntlet, so to speak, and challenged me to give real scientific evidence. Not replying to his challenge is really not a choice for me, as he claimed that I had not "done my homework." Therefore, in this follow-up response I have chosen five of the twenty-one reasons to demonstrate that Snelling has not done *his* scientific homework. There is not enough space in this short response to give scientific justifications for all twenty-one reasons I provided. Here are the five reasons that I address.

The origin of salt and gypsum deposits

Instead of my explanation that deposits of salt had to form by evaporation of marine water in areas where an arm of the ocean had been cut off for some reason and where a desert climate caused the isolated water to evaporate, Snelling claims (at about the 8:30 mark of the video) that the salt was carried in a solution of hot water. (I make an interpretation here because he did not elaborate on where this hot water came from, but it is generally believed by young-Earth creationists that it was ejected from oceanic volcanic spreading centers from which the "fountains of the deep" emerged.) Supposedly, sufficient salt was concentrated in these solutions that the salt became precipitated when the water cooled. But there are no salt deposits anywhere in the world close to oceanic spreading centers. All are in the interiors of continents and occur multiple times throughout the geologic ages in widely different places in every continent.

I heard a young-Earth creationist in a talk say that the hot water that carried the ions of sodium and chlorine of which salt is composed was ejected at high speeds as steam from the oceanic spreading centers. If so, somehow the salt-bearing steam had to cool as a mass of liquid instead of expanding explosively as an extremely hot gas and thereby becoming scattered and dispersed in the atmosphere. Then, this condensed mass of hot water (whether once steam or not) had to land somewhere in large volumes of Noah's flood waters. The problem for Snelling is that the sodium and chlorine ions in this water mass are so soluble in water that they would become dispersed in the huge volumes of the flood waters and never concentrate to the point of precipitation to form solid masses of layered salt (see http://www.csun.edu/~vcgeo005/collins.pdf). What Snelling proposes is impossible and shows that he has not done his homework. The natural laws for chemical behavior must be obeyed.

Sand dunes with giant cross-bedding in the Mesozoic rocks in Zion National Park

Snelling claims (about nine minutes into the video) that the cross-bedding in sandstone dunes was created under water

(like the sand dunes that are created under the Golden Gate Bridge by rushing tidal water). He claims that the angles of maximum dip of cross-bedding are less than 30 degrees, and therefore, this cross-bedding of sandstones in the Grand Canyon area was deposited under water. Figure 1 is a photo of cross-bedding of dunes a few miles north of the Grand Canyon National Park boundary that clearly shows angles greater than 30 degrees—which is clear evidence that these dunes were formed under dry desert conditions instead of under Noah's flood waters. Adjacent to it (right image) is another example from the Vermillion Cliffs in the same area. A similar image is on page 54 of the Grand Canyon book (cited below), also with dip angles greater than 30 degrees. All of these images show that Snelling has not done his homework.

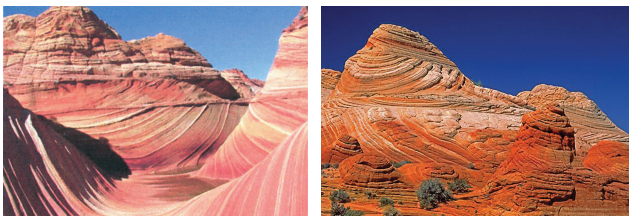


Figure 1: "The Wave," dune cross-bedding in Jurassic Navajo sandstone formation, North Coyote Buttes, Coconino County, Arizona, showing dip angles greater than 30 degrees (https://en.wikipedia.org/wiki/Coyote_Buttes).

Moreover, sand dunes like those formed underwater under the Golden Gate Bridge would not be expected to be formed by Noah's worldwide flood and be stacked like what is seen in these two images. Even the Permian Coconino sandstone that crops out in the Grand Canyon has desert dune cross-bedding with dips of 30 degrees and delicate footprint trails of spiders, scorpions, and millipedes and raindrop prints (Figure 2) that could not have been preserved on the surfaces of dunes formed by the raging torrents of Noah's flood waters. See illustrations on pages 58 and 156 in the book *The Grand Canyon, Monument to an Ancient Earth*, 2016, edited by geologist Carol Hill and others.

Raindrop prints occur in many places around the world

Snelling claims (about twelve minutes into the video) that he has seen raindrop prints in the Grand Canyon when he has led tours down the canyon on rafts. He says that raindrop prints in the canyon do not look like anything that he has observed in the adjacent rocks. He suggests that such may be just concentrations of precipitated minerals. Figure 2 shows fossilized raindrop prints as casts on the underside of the prints.

You can see the clear demonstration of the bowl-shape impact basins where the globular water drops have collided with mud and the raised splash-rims that result from the impact. In this underside view, the rims project into the rock instead of being raised around the bowls, and the bowls extend upward instead of downward. It is clear that these really are fossilized raindrop prints. Next to this image are fossil raindrop prints in the Coconino sandstone, which clearly shows that rain fell on the sand in a desert dune in open air. Paleontologist Phil Senter records raindrop prints in several geologic ages (Triassic, Permian, Devonian, and Cambrian) around the world in sedimentary rocks that were also supposedly deposited during Noah's Flood; see Figure 1 in http://www.csun.edu/~vcgeo005/Flood%20geology.pdf. Therefore, Snelling has not done his homework, because there are published data that show that raindrop prints do in fact occur in the supposed Noah's flood deposits.

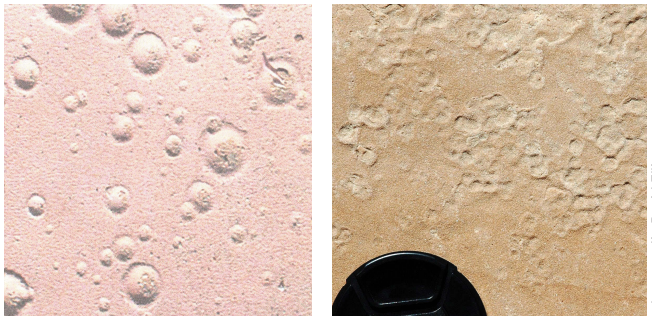


photo credit: David Elliott.

Figure 2: Fossilized raindrop prints.

Coccoliths in the White Cliffs of Dover

I suggest that the coccoliths, which are a kind of algae with calcareous platelets in spherical shells, cannot be deposited beneath water thicknesses of over 350 feet during Noah's flood because they require sunlight for photosynthesis and must exist near the ocean surface to obtain the energy from the sun and that having that many coccoliths (trillions and trillions of them) in the oceanic waters at the same time as the one-year flood would cut out the sunlight for coccoliths a few feet below the ocean surface. Snelling argues (at the 13:12 mark of the video) that I cannot use the chalk (composed of coccoliths) in the White Cliffs of Dover as an example because they are on the continent and not like coccoliths that occur in modern oceans.

This is a ridiculous argument because coccoliths in the past did not grow on continents; they grew in ocean waters. He then proceeds to use an example of coccoliths deposited in Kansas, which is far in the interior of our continent. He points out that these deposits contain fossilized remains of a fish (twelve feet long) with another smaller fish in its stom-

Figure 3: White Cliffs of Dover.

ach as well as fossils of large turtles, birds, and a plesiosaur. He claims that because these kinds of creatures are mixed together, they had to be deposited suddenly during a rapid change in the chemistry of Noah's flood waters that caused all the coccoliths to suddenly plunge down and be buried. He says that they could not have been buried over millions of years by falling dead coccoliths that settle at a few inches at a time over thousands of years.

As I have pointed out, a 350-foot thickness of coccoliths cannot be living at the same time in ocean waters; furthermore, the skeletal bones of the various fish, reptiles, and birds are composed of calcium carbonate, which is the same composition as the calcareous platelets of the coccoliths. The oceanic water was saturated with calcium ions, and therefore there is no chemical reason the bones of these creatures should dissolve and disappear. They could remain on the ocean floor for millions of years without disappearing.

Moreover, Snelling's statement that birds were buried by the coccoliths is misleading because it implies that birds were living at that time (the Cretaceous Age) during Noah's flood. They were not birds in the modern sense but were gliding reptiles (pterodactyls) with teeth. One does not know how these various creatures could have been killed, but a toxic algal bloom could have been the cause. Such blooms commonly and suddenly kill thousands of fish and other marine creatures today.

An experiment done on a live olive tree by Charles Munroe III

I suggested that an experiment with the submergence of a live olive tree under water for three months showing that the olive tree was killed by this submergence was evidence that a worldwide flood never happened. Snelling discusses the olive tree experiment (about twenty-two minutes into the video) and asks where the published article is in which this experiment was described. He said that Answers in Genesis would not consider any assertion unless they can see a published article. Figure 4 below at left contains the images in question.

And, thereby, here is the published article. Snelling said that olive trees that lived during Noah's flood could have been hardier than those living today. He also asserts that olive trees would have been like orange trees in that they could reproduce asexually by budding from roots or from fragmented branches. But neither Snelling nor his colleagues have demonstrated by any experimental studies of their own that a live olive tree or any fragmented branches that have been submerged for three months (or even six months during Noah's flood) can come alive again. He is merely speculating without scientific support.

Figure 4: Live olive tree and same tree after submergence under water for three months. Courtesy Charles Munroe III.

Conclusion

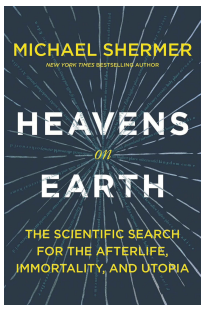
These five examples show that Snelling has not done his homework. I agree that I look at many situations from a uniformitarianism point of view, but geologists recognize that not all processes that occur during geologic history are necessarily slow events occurring over millions of years. Catastrophic events, such as the explosion of Mt. St. Helens, are examples. But young-Earth creationists cannot decide that uniformitarianism does not work during the Genesis week and up until Noah's flood and then decide that they will accept such processes at other times. I note that Snelling never responds to my Reason 21, in which I point out that the Redwall limestone has karst topography (cave formation) in it as well as deep erosion channels of the Surprise Canyon Formation on top of it, neither of which could happen in less than one year during Noah's flood. He chooses data that he thinks fit his model and ignores data that do not fit. Science is not done that way. As I said in my original Skeptical Inquirer article, it only takes one ugly fact to ruin a beautiful hypothesis. Moreover, a local huge flood that occurred in Mesopotamia during biblical times is certainly possible. For more information, see http://www.csun.edu/~vcgeo005/Collins2.pdf and http://www.csun.edu/~vcgeo005/Carol%201.pdf.

As a further point, my March/April Skeptical Inquirer article gave physical reasons Noah's worldwide flood never happened, but there are equally strong reasons from biological evidence such a flood never happened. See article to be published in a forthcoming issue of the Skeptical Inquirer. This article also gives evidence that the Earth cannot be 6,000 years old, but many billions of years old. ■

Lorence G. Collins is a retired professor of geology from California State University Northridge. On the website Opposition to Creationism, he has more than three dozen articles describing the views of young-Earth creationists and their scientific errors in interpretations.

Tackling the Big Questions

Harriet Hall



Heavens on Earth: The Scientific Search for the Afterlife, Immortality, and Utopia. By Michael Shermer. New York: Henry Holt and Co., 2018. ISBN: 978-1-62779-857-0. 320 pp. Hardcover, $30.00.

In 1997, Michael Shermer wrote one of the classics of skepticism, *Why People Believe Weird Things*. He has continued to produce skeptical books at regular intervals, with topics as diverse as intelligent design, holocaust denial, and morality. His new book, *Heavens on Earth*, is his most ambitious yet. In it, he grapples with immortality, the afterlife, reincarnation, near-death experiences, the soul, heaven, utopias, and the meaning of life. These are topics usually relegated to the spheres of philosophy and religion, but Shermer approaches them through science, looking for evidence—or lack thereof.

The topics of *Heavens on Earth* are usually relegated to the spheres of philosophy and religion, but Shermer approaches them through science, looking for evidence—or lack thereof.

The belief that death is not final is overwhelmingly common—even among a third of atheists and agnostics—but it is not supported by a shred of evidence. As the story goes, humans are terrified of dying, so they invented comforting narratives including God, a soul that survives the death of the body, resurrection, reincarnation, and methods they hope will extend life. Shermer questions assumptions such as whether contemplating death results in terror. In a survey, only 3 percent of respondents listed "fear of death" as a reason for their belief in God. Final statements of inmates on death row speak of love, not terror. Anthropologists interpret burial customs in terms of belief systems, but the earliest humans may have buried their dead for a more pragmatic reason: dead bodies rot and stink.

Shermer knows Deepak Chopra personally and believes he is sincere. He has tried very hard to understand what Chopra means when he calls consciousness "a quantum mechanical field of interrelatedness," but he doesn't find it credible. He subscribes to the scientific explanation of consciousness as an emergent property of the brain. Without the physical brain, there can be no consciousness, no "soul." He even checked into the Chopra Center to experience Chopra's Ayurvedic regimen of diet, exercise, massage, breathing exercises, and meditation. He found the massage and meditation relaxing, and he acknowledges that there is some scientific evidence for benefits from meditation. But he doesn't accept Chopra's view of consciousness as a fundamental property of the universe. I was amused to see that Deepak Chopra had written one of the blurbs on the back of the book's jacket: "I appreciate every evolutionary step skepticism takes toward openness. *Heavens on Earth* is an affirmation that other worldviews deserve respect and understanding. In this book science may actually be catching up with the world's wisdom traditions." I had to wonder if he read the same book I did.

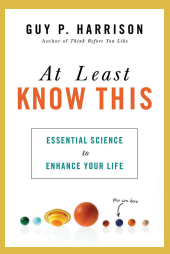
Near death experiences and accounts of reincarnation have been claimed as scientific evidence for the afterlife, but Shermer examines that evidence in detail and finds it lacking. Naturalistic explanations make more sense. Anomalous psychological experiences are explained by science; talking to the dead is explained by cold reading. Strange things happen. He describes a very strange experience of his own, when a radio long forgotten in a drawer suddenly started playing at a time and in a way that held meaning for his family. He says, "There is no such thing as the supernatural or the paranormal. There is just the natural and the normal and mysteries we have yet to solve with natural and normal explanations."

He explains how arguments for the soul are flawed. The very feeling of a unified self is an illusion. We are more like a Swiss army knife, a collection of distinct but interacting modules. Most of the brain's operations are not available to the conscious mind.

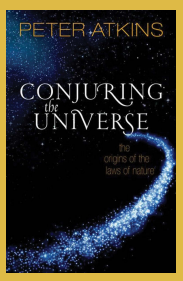
Shermer covers efforts to extend the human life span, including those of the cryonicists, extropians, transhumanists, Omega Point theorists, singularitarians, and mind uploaders. He explains why he is pessimistic about the possibility of

[NEW AND NOTABLE

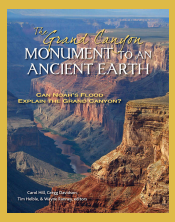
Listing does not preclude future review.



AT LEAST KNOW THIS: Essential Science to Enhance Your Life. Guy P. Harrison. Prolific journalist and author Guy Harrison (his books include *Think Before You Like*, *Good Thinking*, *Think*, and *50 Popular Beliefs That People Think Are True*) returns with a book on the "profound answers" to simple questions about who we are and where we came from. He emphasizes this isn't a book of science trivia or mere conversation fodder: "This is important stuff. This is the foundation from which further learning arises." His chapter titles give the idea: When Did Everything Begin? Who are We? What is Everything Made Of? What is Life? How Did We Get Here? Why Does the Race Concept Fail? Where Are We? How Do Brains Work? How Will Everything End? As he concludes, "The more we learn, the more alive and awake we become." Prometheus Books, 2018, 416 pp., $19.00.



CONJURING THE UNIVERSE: The Origins of the Laws of Nature. Peter Atkins. The noted scientist and writer Peter Atkins (Oxford University) here provides a personal and even witty view of how the laws of nature and the fundamental constants came about. The physical laws (of conservation of energy, of electromagnetism, of classical and quantum mechanics, and of thermodynamics) and constants account for the deep structure of the world and appear to be consistent whenever and wherever they are tested and not to have changed over time. Why? How? His mantra is simply that most of the laws emerged from deep symmetries without much happening. In the course of the book, he explains "how much was not much." Oxford University Press, 2018, 216 pp., $24.95.



THE GRAND CANYON, MONUMENT TO AN ANCIENT EARTH: Can Noah's Flood Explain the Grand Canyon? Carol Hill, Gregg Davidson, Tim Helble, and Wayne Ranney, editors. This excellent and handsomely produced book is the result of a remarkable project led by research geologist Carol Hill and ten other scientist experts on the Grand Canyon to directly address claims and distortions of young-Earth creationists about the origin, history, and age of the canyon and its rocks. What makes it unusual and potentially highly effective is that many of the authors are also Christians (and yet strong defenders of science). They understand how to analyze the many specific claims of "flood geologists" and write clearly about the real science in a way that is nonthreatening, effective, and potentially persuasive to the vast segments of the lay public—including deeply religious people—who may be confused by the claims. It is an unusual challenge they've undertaken, but they seem to have done it. They end with two important points: "Science has to be allowed to go where the evidence leads" and "Truth always matters!" An attractive, oversized book with hundreds of beautiful color photos and graphics on high-quality paper. A much-needed work. Kregel Publications, 2016, 240 pp., $26.99.

uploading minds to computers. Even if it could be done, would it be *you*?

The "good old days" were dreadful. This is by far the best time in history to be alive, so why do 71 percent of people think everything is getting worse? Shermer tries to explain the psychological and evolutionary factors behind this pessimism. Quests for utopias have repeatedly gone astray. "Humans are not perfectible because no such thing as perfection exists." Neither utopias nor dystopias are accurate portrayals of reality.

Why do we age and die? Science provides answers, and Shermer covers the evidence in detail. Basically, we die so that others can live. Individuals are mortal, but the species survives. We can even hope to achieve species immortality by some day going to the stars.

The last chapter is titled "Imagine There's No Heaven: Finding Meaning in a Meaningless Universe." The feeling of awe for the wonder of the cosmos can provide meaning. Some people call this spirituality; some think it is evidence for God. Neither concept is necessary. Stars died so we could live. That's pretty cool! From the reality discovered and described by science, we can derive meaning, "through recognition of our uniqueness, through gratitude for having the chance to live, through the love of others and others' love for us, and through engagement with the world with courage and integrity." "We create our own purpose, and we do this by fulfilling our nature, by living in accord with our essence, by being true to ourselves."

The book ends with this hopeful thought:

> We are given this one chance to live, some four score trips around the sun, a brief but glorious moment in the cosmic drama unfolding on this provisional proscenium. Given all we know about the universe and the laws of nature, that is the most any of us can reasonably hope for. Fortunately, it is enough. It is the soul of life. It is heaven on earth.

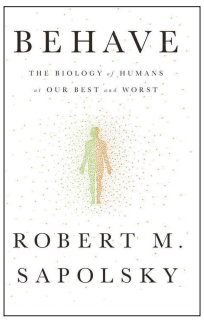
Some will argue that Shermer goes beyond the science or that these subjects aren't amenable to science. You probably won't agree with everything Shermer says in this book, but some of the scientific evidence he describes may be new to you, and it will definitely fulfill the highest purpose of a book: to make the reader think. It might even challenge some treasured assumptions.

It is well written, engaging, and will appeal to the general reader and to anyone who is searching for answers to the big questions. There are some unfortunate errors that I hope will be corrected in future editions: Mark Crislip is an infectious disease specialist, not an ER doc, and psilocybin is not LSD. ■

Harriet Hall, MD, also known as the "SkepDoc," is a retired Air Force family physician and flight surgeon who writes about pseudoscientific and so-called alternative medicine. She is a contributing editor and frequent contributor to the Skeptical Inquirer.

A Monumental, but Flawed, Effort to Understand Behavior

Reynold Spector

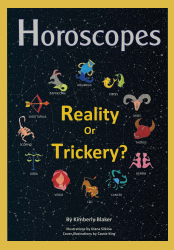


Behave: The Biology of Humans at Our Best and Worst. By Robert M. Sapolsky. New York: Penguin Press, 2017. ISBN 978-1594205071. 790 pp. Hardcover, $35.00.

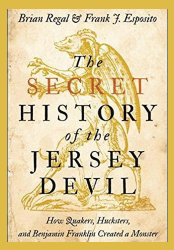
In his long (790 page), extensively referenced book *Behave: The Biology of Humans at Our Best and Worst*, neurobiologist and primatologist Robert Sapolsky attempts to uncover the cause and consequences of many aspects of human behavior employing techniques and results from neuroscience, evolution, psychology, sociology, molecular biology, genetics, and moral philosophy with a sociological bent. He begins his analysis and synthesis of behavioral data with the underlying neurobiological and hormonal causes of behavior. Later he focuses on fetal development, childhood, adolescence, and adulthood. Still later, he focuses on cultural and ecological factors that influence behavior. He spends considerable time on morality and less on religion.

In many places, Sapolsky plunges into controversial areas.

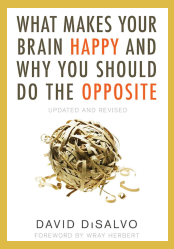
In many places, Sapolsky plunges into controversial areas. For example, he argues that Steven Pinker's thesis that "people have gotten less awful" over the centuries is overly optimistic. He implies that Pinker is a Pangloss. Sapolsky points out that when you take time (duration) as well as population size into account, he finds that World War II, the An Lushan Rebellion (China) and the killings in World War I, the Taiping Rebellion (China), and Tamerlane's depredations lead the list of horrific events. He also emphasizes that the recent horrific wars in Vietnam, Afghanistan, and Iraq; the horren-



HOROSCOPES: Reality or Trickery? Kimberly Blaker. Illustrations by Diana Silkina. In this slim book for children and teens, writer and skeptic Kimberly Blaker guides them easily through the topic of astrology and horoscopes. "Is there a scientific explanation for why your horoscopes seemed so true?" she asks at the beginning. "You're going to uncover a lot of fascinating facts about horoscopes and astrology as you sleuth for answers to the question. Then, toward the end of the book, you can also do experiments and activities of your own to help you determine for yourself whether astrology is real or just a hoax." Green Grove Press, 2018, 78 pp., $9.99.


Brian Regal & Frank J. Esposito
The SECRET HISTORY of the JERSEY DEVIL
How Quakers, Hucksters, and Benjamin Franklin Created a Monster

THE SECRET HISTORY OF THE JERSEY DEVIL: How Quakers, Hucksters, and Benjamin Franklin Created a Monster. Brian Regal and Frank J. Esposito. Two historians (Kean University) examine the genesis of the popular myth in which in 1735 a witch named Mother Leeds gave birth to a horrifying monster—a deformed flying horse with glowing red eyes—that flew up the chimney of her New Jersey home and disappeared into the Pine Barrens. Regal and Esposito find that everything you think you know about the Jersey Devil is wrong and that the real story of the New Jersey Devil's birth is far more interesting and complex than most skeptics and believers alike think. Involved are land grabs, astrological predictions, mermaids, dinosaur bones, sideshows, and Founding Father Benjamin Franklin. Johns Hopkins University Press, 2018, 160 pp., $24.95.



WHAT MAKES YOUR BRAIN HAPPY AND WHY YOU SHOULD DO THE OPPOSITE. Updated and Revised. David DiSalvo. This is an update of a book first published in 2011. Subsequent research shows, says the author, that the book's original thesis is more strongly supported now than even when it was first published: "The brain is a prediction and pattern-detection machine with a penchant for storytelling that craves certainty, stability, and predictability." And that's all great—except when it's not. The goal is to let us know why we think as we do and do as we do. The title refers to the fact that much of what makes our brains "happy" leads to errors, biases, and distortions that cloud our judgment and muddle our decision making. Prometheus Books, 2018, 335 pp., $18.00.

—Kendrick Frazier

In parts of Sapolsky's book there are clear deficiencies or wrong statements.

dous killing crimes of Stalin and Mao; and the ongoing wars in Syria, Iraq, Afghanistan, and Africa disconfirm Pinker's optimistic thesis. In another part of the book, he accuses Pinker of "cherry-picking." (Pinker responds to such criticisms in a chapter of his new book *Enlightenment Now* that was published in the May/June 2018 Skeptical Inquirer.)

In other parts of Sapolsky's book there are clear deficiencies or wrong statements. For example, he implicitly assumes the critical importance of the Western liberal notion of the primacy of harm and fairness, which in turn leads to the evolutionary theory of kin selection and reciprocal fairness. However, he ignores important non-Western attitudes that motivate behavior in the majority of humans: these include: 1) societies in which ingroup/outgroup dynamics and loyalty are crucial (e.g., Japan); 2) societies where authority, respect, and obedience are all important (neo-Confucian societies); 3) societies where spiritual purity is paramount; and 4) societies where noncarnal, nonviolent behavior is critical (Amish). Thus, in his discussion of morality, Sapolsky's implicit assumptions lead to an overvaluing of certain behaviors, e.g., empathy (see Paul Bloom's 2016 book *Against Empathy*: *The Case for Rational Compassion* for a contrary view). I, like many others, would argue you cannot understand many behaviors and events unless you take nonliberal non-Western worldviews into account. Sapolsky might be surprised to know that in Korea (where I served in the U.S. Army in 1969 and spoke Korean), Good Samaritans were widely viewed by Koreans as fools for giving away their family or government's wealth to strangers.

This book is a monumental effort to describe and understand behavior, especially human behavior. But in many places it is deficient.

Now, to the heart of Sapolsky's book: What causes behavior and from whence does it originate? And what are the consequences? He focuses on "good" and "bad" behaviors and, at great length, on the underpinnings of "moral" behavior. However, one critical aspect of his discussions is missing: the thorough and systematic work of centuries of moral philosophers beginning with Plato, Aristotle, and several Chinese scholars culminating in the work of Bernard Williams and Derek Parfitt of Cambridge University. He also does not emphasize the critical role that the law plays in determining behavior, especially in America.

Sapolsky rightly emphasizes the central nervous system—especially the brain and, later in the book, hormones. However, he is apparently not familiar with (or disregards) reports that do not support his views. For example, he ignores nutrition and many other important environmental factors. He tries to localize where in the brain certain behaviors originate. He assumes brain scanning studies are meaningful, i.e., changes in brain scans associated with certain behaviors or perceptions are scientifically sound. However, he does not emphasize that brain scans, e.g., fMRI and PET scans, actually measure blood flow, blood volume, deoxygenated hemoglobin, or glucose and/or oxygen uptake; he does not note that non-neural processes can affect fMRI and PET. (See Jerome Kagan's 2017 book *Five Constraints on Predicting Behavior* for a detailed critique of Sapolsky's methods.)

In the many psychological studies he references, Sapolsky is not aware of or ignores the findings that many such studies are nonreplicable and that many are done in artificial laboratory conditions. Moreover, even if correct, such studies are often done on college volunteers and may not be generalizable to the broader population. Context greatly matters, as Kagan emphasizes.

Sapolsky also places too much emphasis on research employing mice, rats, primates, and particularly his favorites, baboons. The behavior and physiology of these animals often does not extrapolate to humans. A rat brain weighs 1 gram; a human brain 1 kilogram. Moreover, humans have neural structures, connections, and cortical areas that other mammals, including primates, do not have.

Other methodological problems abound throughout the book. For example, Sapolsky discusses almost all studies in terms of means (averages)

and statistical significance. He rarely discusses magnitudes of such differences—or that in fMRI very small differences can be greatly magnified and overemphasized. This lack of focus on the magnitude of differences instead of statistical significance is a grievous fault.

Finally, I note two errors of fact in areas in which I am thoroughly familiar and have published. First, on page 560, Sapolsky states categorically that substance P is involved in depression. He says "drugs that block the action of substance P can have marked anti-depressant properties." This is not true. In the 1990s when I was head of development at Merck, we hypothesized that a "blocker" of substance P in the brain would have anti-emetic and antidepressant properties. The former is true, and our drug aprepitant, now generic, a substance P blocker, was approved by the FDA almost two decades ago for use as an anti-emetic. However, although one initial small pilot study suggested that aprepitant had antidepressant properties, large controlled trials did not confirm this hypothesis. Thus, Sapolsky is wrong about substance P and depression.

More important, on pages 147–150 Sapolsky argues that in humans "throughout adult life there is neurogenesis in brain," for example, there is the birth of new neurons in the hippocampus and cerebral cortex. This is an extremely important issue for neurobiology, pharmacology, exercise physiology, aging, and hormonal action. For example, in rats, exercise and antidepressants were shown to stimulate neurogenesis. Moreover, Sapolsky argues that Professor Pasko Rakic (Yale) was incorrect in doubting many reports of the role of neurogenesis in animals and humans. Because of Rakic's negativity about neurogenesis in adult humans, Sapolsky makes an *ad hominem* attack on Rakic, indirectly suggesting Rakic held up the "field" for ten years. In fact, many of the earlier studies that reported neurogenesis in the adult human brain made errors. First, the authors of these studies assumed DNA synthesis in the human brain was in part due to the birth of new neurons. This turned out to be not correct. I worked in the field of DNA synthesis in brains of animals and humans for a decade. It is true that DNA synthesis in adult human brain neurons occurs, but not for neurogenesis (the birth of new neurons). DNA synthesis in neurons, as in other cells, serves several purposes, including DNA repair, the repair of the removal of the sixth base in DNA (hydroxymethylcytosine), and intracellular mitochondrial replication. Mitochondria last only about thirty days and need to be replaced frequently. DNA synthesis also occurs in degenerating and dying neurons.

Sapolsky also does not emphasize the critical role that the law plays in determining behavior, especially in America.

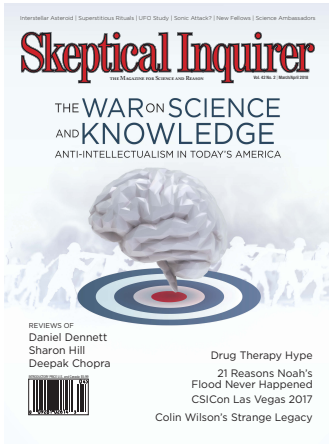
A highly publicized report twenty years ago by Elizabeth Gould of neurogenesis in the adult primate neocortex turned out to be a claim that could not be replicated. Moreover, there were other kinds of errors in the early reports of widespread brain neurogenesis in animals as well as adult humans, e.g., mistaking dividing endothelial and glial cells for neurons. (Sapolsky quotes the initial incorrect or misleading reports.) Consequently, in the past few years, there has developed a consensus that in only one small part of the adult human brain (the dentate gyrus of the hippocampus) might there be neurogenesis. However, more recently, multiple reports using increasingly sophisticated techniques have not found neurogenesis in the adult human brain, or if there is, it is below the level of detection—much less than 1 percent per year in the dentate gyrus and nowhere else. (See Shawn F. Sorrells et al.'s 2018 article "Human Hippocampal Neurogenesis Drops Sharply in Children to Undetectable Levels in Adults" in the journal *Nature*.) Thus, these recent more sophisticated experimental investigations give good reasons to doubt that quantitatively important human adult neurogenesis occurs. Moreover, unlike in rodents, the belief that human depression is due to deficient neurogenesis is obviously incorrect and that exercise, environmental enrichment, antidepressants, etc., might enhance neurogenesis in adult human brains is also almost certainly incorrect since significant neurogenesis in adult humans doesn't occur. Sapolsky's *ad hominem* attacks on Pasko Rakic deserve an apology.

To explain the lack of neurogenesis in adult humans, in 1985 Rakic and others proposed a theory that suggests that the lack of human neurogenesis is beneficial, so that long-term memory and other key functions can last over the entire life span. As I've noted, the extant reliable data support this very important theory. The amount of time, effort, and taxpayer money wasted on murine models is staggering.

I believe that Sapolsky is biased in his discussion of neurogenesis. He is trying to show there is tremendous "plasticity" in the brain that can be affected by environmental factors. This is undoubtedly true; for example, nutrition, education, and experience can affect the development and function of the human brain and attendant behavior. But there is no convincing evidence that after about age seven neurogenesis contributes much if anything to plasticity.

In summary, this book is a monumental effort to describe and understand behavior, especially human behavior. But in many places it is deficient—with an implicit point of view that affects Sapolsky's analysis and synthesis, many errors of fact and interpretation, and the lack of coverage of several key drivers of behavior, for example the law. ■

Reynold Spector, MD, is adjunct professor of medicine, Robert Wood Johnson Medical School, Colts Neck, New Jersey. He wrote on drug therapy hype in the March/April 2018 issue.



The War on Science

In his survey of the academic backdrop to today's rampant unreason, Professor Sidky suggests a causative link between the rise of what he calls postmodernism and the unreason he sees around us ("The War on Science, Anti-Intellectualism, and 'Alternative Ways of Knowing' in 21st-Century America," March/April 2018). Goofy thinking is rampant, and perhaps English professors, historians, anthropologists, and philosophers do exert some tenuous influence on the general public, but to suggest that academics who question our socially constructed cultural verities have caused the public to reject science and reason is a misreading of how culture works. In fact, tempests in our academic teapots far more often reflect cultural shifts than cause them.

Some of the academic work Sidky cites is indeed silly, even entertainingly so, and I thank him for the smiles. Nonetheless, Sidky grants the legitimacy of much of that work while simultaneously saying it encourages or contributes to the irrationality that permeates society.

It's a stretch to suggest, as Sidky does, that academics who question our assumptions have destroyed the philosophic underpinnings of science and reason when other very powerful forces in our culture clearly don't like people thinking too much. Religion would certainly have to top that list, but it's not the only culprit. Most forget our entire lives are embedded in an economic system that tolerates reason only as long as it is the servant of short-term profit.

Scott Pruitt, evangelical Christian and current head of the Environmental Protection Agency (EPA), recently offered a fine example of how religion and capitalism join forces to strangle reason: "The idea of 'dominion' is about mastery: Human beings have their right to take what they want from the earth, in terms of natural resources, without regards to how it might affect other species" (quoted on Vox.com).

Are science and reason vastly undervalued in 2018 America? With leaders such as Pruitt, who could reasonably deny it? Has postmodern academia, with all its constructing and deconstructing, made some small contribution to the present state of affairs? Maybe a tad.

But as long as we accept the preposterous claims of religion and refuse to examine the assumptions and effects of the economic system we're all beholden to, we won't need the permission of professors to act more than a little nuts.

Ken Winkes
Conway, Washington

It's not just a war on science and knowledge; it's a war on reality. Four hundred years ago, everyone agreed that Earth is the center of the universe and that humans are the reason for its existence. Now, thanks to science, we know that we are an accident of evolution, a species of ape inhabiting a tiny speck in an unimaginably huge and indifferent universe. Did God really create a trillion galaxies just to make us? This is quite a demotion and a big blow to our collective ego, and many people simply reject it in favor of their preferred myths. Having rejected this reality, many people feel free to reject other aspects of reality, such as global climate change and evolution. Like Trump's, our first impulse is to protect our ego and our exceptionalism, whether that relates to us personally, to our species, our nation, our race, or our religion. This is basic human nature, and I doubt whether a majority will ever fully embrace reality as revealed by scientific inquiry.

John Powell
McFarland, Wisconsin

The author blames primarily leftist postmodern philosophy for anti-intellectualism and antiscience. Follow the money, Professor Sidky. For example, the real culprits for climate change denial are Big Oil and Big Coal. Some academics greatly inflate academic influence on society, but in fact their influence is very small (they mostly just talk to one another) and is dwarfed by the big money interests.

John Grant
Baltimore, Maryland

Sidky intimates that the antiscience movement in academia started in the 1970s. It started earlier, although without a name. My undergraduate career, UC Berkeley (1947–1951), started with physics and ended with English literature, with some thinking that I might end up a professor. But disillusion came with a senior-year seminar on D.H. Lawrence. Lawrence wrote mostly what he considered realistic novels but also several outright short fantasies, *The Rocking Horse Winner* being the best known due to its film version.

But I noticed that Lawrence's realistic novels were often based on what I considered fictional science. For example, at a dinner party the hostess wants to make a speech. Lawrence writes that she mentally orders, by her will, that everyone else cease talking to which they comply. In another example, a rich young Englishman of 1912 commits suicide because, you see, he was rich and young. I pointed out that there was no known process of thought transference by purely mental means and that there was not a wave of suicides in the British upper classes prior to The Great War.

Having, since childhood, listened to discussions of the creation of historical fiction by one who was a master of it, I felt that realistic fiction had to be based on a factual background that did not affront scientific reality. The argument of my term paper received a C, simply because I failed to accept the scientific fictions in which Lawrence, and other supposed modernists, believed. That experience closed off my interest in the academic side of literature, considerably before Sidky suggests postmodernism started.

John Forester
Lemon Grove, California

I learned from the article by Prof. Sidky how left-wing academic postmodern relativism has attacked science over the past forty years and how the right wing has enthusiastically adopted its principles. In academia and the news media, we mostly hear about the fables and foibles of conservatives. I've kept track of antiscience on both sides as I've seen them misinterpret and ignore scientific results. Some of these false beliefs have been codified into laws, such as U.S. laws against stem-cell research and European laws against GMO foods.

L.G. Wade
Walla Walla, Washington

While I agree that postmodern and deconstructionist ideas bear a lot of blame for the current shriveling of general trust in science, I wonder whether the stagnation of scientific progress doesn't provide the intellectual space for such obscurantism to thrive. From the beginning of the seventeenth century through the middle of the twentieth, scientific theories advanced decade after decade. From Kepler's planetary laws to Turing and Shannon, each generation produced profound new theories and mathematical tools. In the past century, the incompatibilities between the laws of small- and large-scale physics remain unresolved. We work out the implications of earlier theories and say "gee whiz!" but have advanced no significant new theories. When neither science nor superstition advances, it is easier to equate them.

Don Martin
Toronto, Ontario

H. Sidky replies:

First, I thank the many readers who have taken time to write responses to "The War on Science." Dialogue on this topic is essential as the assault on science and reason continues unabated and has even gained strength under the current

abysmal political circumstances. In his letter, Ken Winkes suggests that I have presented a misreading of how culture works. I think he has misconstrued the article because I start out stating specifically that the rise of anti-intellectualism and antiscience perspectives involve many complex interconnected factors, such as globalization, demographic shifts, changes in the socioeconomic infrastructure, and disparities in wealth and power. My objective in this article has been to highlight the culpability of American academia in this sad affair rather than look at the broader picture. Neither have I left out the "very powerful forces in our culture," a point also indicated by John Grant. I have clearly noted the unholy antiscience alliance between fundamentalist churches and profit-hungry agrochemical industries. I disagree with Winkes's statement that we are talking about a "tempest in a teapot" and that academia is a reflection rather than a force in shaping minds. There is certainly an interplay between broader cultural forces and academic disciplines, but to suggest that college students leave antiscience classes indifferent is naive and unrealistic.

John Powell's point that this is "a war on reality" is on the mark. The very definition of irrationalism, which is how I characterize the rightwing religious/antiscience perspectives (paranormalism, oxymoronic creation science, and bogus alternative ways of knowing), is belief despite the absence of evidence, or a denial of reality. John Forester is absolutely correct that the roots of antiscience go back earlier than the rise of postmodernism. I focused on the latter alone. But in reality, antiscience sentiments go even further with the reactions to Copernicus, Galileo, Hume, and Darwin. L.G. Wade has astutely called attention to the frightening fact that antiscience beliefs are being legally codified. I am unsure of Don Martin's suggestion that the "stagnation of scientific progress" has created intellectual space for obscurantism to thrive. I do not think science is stagnating. Just think about the massive science-based changes that have taken place since World War II.

The real problem is that the scientific community has failed to pay sufficient attention to the ravings of what Thomas Paine described as the "blasphemers of science." Those scientists who have paid attention have opted for mutual coexistence, a view expressed in Stephen Jay Gould's unfortunate idea of "nonoverlapping magisteria." It is such an approach that has created intellectual space for supernaturalism, paranormalism, and irrationalism rather than the stagnation of science. Antiscience narratives are not a joke, amusing, "silly," or "entertaining," as Winkes seems to think, and unless rational thinking folks take this problem seriously and adopt a no-holds-barred stance in this war, we are all in trouble.

Correction: The opening phrase in H. Sidky's "The War on Science …" in our March/April 2018 issue should have read, "At the start of the twenty-first century" (not twentieth century). Many readers, nicely attuned to what century we are living in, noticed and kindly informed us we were off by a hundred years. —Editors.

21 Reasons Noah's Worldwide Flood Never Happened

Lorence Collins's article on "Twenty-One Reasons Noah's Worldwide Flood Never Happened" (March/April 2018) reiterates the clear evidence that young-Earth creationists do not have a leg to stand on with regard to a catastrophic Noachian flood. It is unfortunate that he did not give a more reliable reference to the stimulating hypothesis regarding a prehistoric flooding of the Black Sea basin as the source of the Noachian story. A good link to this is provided by Googling "Black Sea Deluge Hypothesis," which leads to a well-referenced Wikipedia article on the subject. Perhaps Collins's 2009 reference, cited in his article, covers this, but that URL is no longer on the web and thus the importance of the hypothesis cannot be explored.

Dr. A.R. (Pete) Palmer
Boulder, Colorado

Lorence Collins replies to Palmer:

I am aware of this possibility, and Charles Munroe suggests the Black Sea Deluge as the source of the flood myth. His article is on my website as "The Flood of Noah" at http://www.csun.edu/~vcgeo005/Nr-39TheFlood.pdf.

While I don't disagree with any of Collins's reasons that Noah's worldwide flood never happened, some of them depend on the assumption that the estimated ages of formations are geological (not biblical) and for others that creationists have cherry-picked the data and reinterpreted it.

To me, the most convincing single piece of evidence that the Canyon is old comes from the volcanics on the west end of the Canyon, the Uinkaret Plateau. There are lava dams 2,000 feet high that were laid down in an already existing canyon. Yet they have been eroded back to about river level. They *must* have been formed after Noah's flood, yet we all know God promised us he would never do that again—the rainbow story.

It would be impossible to erode most of 2,000 feet of basalt in a mere 4,360 years (almost six inches per year!). I don't see how this can be explained with a one-flood scenario, short of a miracle, which science can't abide. If we resort to a miracle, then why not just claim the whole Canyon was a result of a miracle? Further, at six inches a year, Lava Falls would be completely gone by now, in the time since Powell's trip in 1868, yet it hasn't changed noticeably.

The wind-blown sand of the Coconino Sandstone, with its grain size, frosting, cross-bedding, and lizard tracks, probably comes in a close second, but the creationists explain it away as wind-blown sand carried in by a flood surge (and ignore the animal tracks).

Creationists seem to not understand erosion, either. Fluvial erosion occurs primarily by water carrying sediment that grinds away at the bottom. Doubling the depth and/or flow rate of the water does not allow for half the time. The added water, high above the bottom, does little to erode.

Andy Odell
Flagstaff, Arizona

Collins replies to Odell:

Yes, I have known about the lava flows that occur in the bottom of the Colorado River that dammed up the river several times. Andy is correct that these very resistant basaltic rocks could not have been eroded out in the 4,350 years since the supposed Noah's Flood. I just did not include this information as a reason in the Twenty-One Reasons article because I thought I had enough reasons, and I knew that the young-Earth creationists (YEC) would not accept such a reason because they argue that U/Pb radiometric dating cannot be trusted because they say that the decay rate of U was different in biblical times. Of course, that is ridiculous, but it is hard to argue against miracles. Most of my other reasons did not have this issue as a problem.

Andy Odell is also correct that creationists seem not to understand erosion. YEC seem to think that a great volume of water is what carved the Grand Canyon. That is not true. The great volume is transported above the bottom of the canyon and has no effect on erosion. It is even not true that the sand grains carried in flood waters do the erosion, particularly when the quartz sand grains have the same hardness as the quartz in the Zoroaster Granite in the bottom of the canyon. What does the major part of the erosion of the canyon is the so-called bedload of boulders that are rolled and tumbled along the bedrock and forcibly ram against the rock that does most of the erosion. Present-day boulders have little effect on erosion because the volume of present day floods is not that large. The amount of erosion goes up, I think, with the sixth power of the velocity of the water flow. It was during the end of the Ice Age when large volumes of water were generated by rains and melting of ice in mountain glaciers that had the major effect on eroding the bottom of the canyon. But even then, it was slow and not at rates required to do the erosion in less than 4,350 years.

Lorence Collins's article "Twenty-One Reasons Noah's Worldwide Flood Never Happened" is very enlightening, especially for the students and lovers of geology. However, the major reason that Noah's flood never happened is strikingly evident unless some

earth scientist can adequately answer the following question: Where did the water come from?

Let's assume that the highest peak in Noah's time was 12,000 feet. The Bible's Genesis account twice mentions forty days and forty nights of rain. Quick arithmetic reveals that for forty days of rain to cover a height of 12,000 feet would require 3,350 inches of rain a day! The website for Kentucky's ark replication, Answers in Genesis, states that the Genesis story has to be true because of dozens of historical flood story myths. Why are there so many flood story myths? Throughout our planet there are hundreds of sites where, hiking in the hills, one can discover sea fossils high above sea level. Before our understanding of plate tectonics, one explanation of the upland sea fossil mystery would be the appearance of a super flood that covered high mountains many years ago.

Mel Gabel
Palm Desert, California

(See also Lorence Collins's Follow-Up column in this issue on p. 56, "Response to Ken Ham and YouTube Comments by Andrew Snelling.")

Are We Skeptics Doing It Right?

Editor Kendrick Frazier is a positive and enthusiastic advocate for scientific skepticism, as he displayed in his Commentary ("In Troubled Times, This Is What We Do," March/April 2018). I'm afraid it feels wrong to join in the cheerleading. "Let's go!" isn't helpful if there is no plan or set of coherent and actionable goals to move toward.

Measurable progress markers in the realm of scientific skepticism seem to be tough to define. I can't readily identify significant positive effects that today's skeptical movement (as distinct from atheism) has made in American society. People don't even know what it means to *be* a "skeptic." This merits concern. The skeptical community has been active for decades. What has been accomplished? Are there established goals? I often doubt we are all on the same bus heading in the same direction.

Where is the public outreach and marketing? How about more than a handful of positive voices promoted in the mainstream press? Where are the politically savvy leaders? Where is the modern media production? Where are the education efforts?

Is it a movement if it doesn't go anywhere? Now is the time to be engaging the highly frustrated public with a compelling narrative for progress. Instead of a fan convention of similar speakers talking to like-minded listeners, a Critical Thinking Summit is sorely needed to craft some strategy aimed to actually do something bold and substantial.

Sharon A. Hill
Harrisburg, Pennsylvania

Hyped Drug Therapies

In the article "Drug Therapy Hype" (March/April 2018), Dr. Spector rightly points out that some pharmaceutical marketing does not accurately reflect the medical benefit evidenced in clinical trials. He is also correct that the initial enthusiasm for angiogenesis inhibitors, such as Avastin, has not translated into broad clinical utility. However, Dr. Spector is misguided when he portrays cancer immunotherapy as unjustified hype. Opdivo is one of six "checkpoint inhibitors" (CPIs) that collectively have achieved FDA approval in more than twenty cancer settings in less than a decade, including melanoma, breast, lymphoma, kidney, gastric, urothelial, head and neck, ovarian, merkel cell, colorectal, and "MSI-high" tumors.

It is true that the summary data from large immunotherapy trials often show low overall response rates and limited improvements in median overall survival. However, he ignores the subset of patients who have very long-lasting remissions (which is washed out of group statistics), even in the lung cancer trial highlighted (see the Kaplan-Meier curve plateaus in the Checkmate-017 trial). In settings such as melanoma, CPIs have led to such lasting remissions in some metastatic patients that clinicians whisper the "C word." Unfortunately, it's not yet possible to predict who will respond and who will not. Thus, industry and academia are devoting tremendous resources to identify predictive biomarkers and complementary approaches to enhance immune-mediated tumor rejection. In my opinion, that's a big deal.

Adam Bristol
San Francisco, California

Ambassadors for Science

First off, my colleagues and I would like to thank you for mentioning National Center for Science Education (NCSE)'s Science Booster Club program in your March/April "Ambassadors for Science" article (by Matthew C. Nisbet). While the depiction of our program was positive and reflective of our larger goals, we wonder if the mention might be revised for accuracy prior to online publication.

In our program, we do not train people to "persuasively discuss" topics related to climate science and evolution; we train people to accurately and engagingly convey information on these topics in community contexts. We find that many communities do not have ready access to information on these topics and that there is a tremendous public appetite for information on climate science and evolution.

The engagement of the University of Iowa with this program has been invaluable. Now that I have left Iowa, graduate students at the University of Iowa are the people on the ground doing this work in communities and collecting data on program measures. I and my colleagues at NCSE develop content and training methods, as well as track and analyze program success.

After the success of our Iowa pilot in 2016, NCSE launched the program nationally in 2017. In 2017, we worked with over 124,000 people across ten states.

Finally, if you are able, it is very helpful for our program leadership if we are named so that people can contact us. I lead the national program with the assistance of my NCSE colleague Claire Adrian-Tucci. My colleague, Professor Maurine Neiman, is the primary faculty member who has helped build the program in Iowa. Many graduate students, including Kyle McElroy, Joseph Jalinsky, and James Woodell, have led the effort to build this program on the ground.

Thank you for considering these points, and thank you again for the kind mention in your publication.

Emily Schoerning, PhD
Director of Research and Community Organizing
National Center for Science Education

[FEEDBACK

The letters column is a forum on matters raised in previous issues. **Letters should be no longer than 225 words**. Due to the volume of letters we receive, not all can be published. Send letters as email text (not attachments) to letters@csicop.org. In the subject line, provide your surname and informative identification, e.g.: "Smith Letter on Jones evolution article." Include your name and address at the end of the letter. You may also mail your letter to the editor to 944 Deer Dr. NE, Albuquerque, NM 87122.

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